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**COMPARISON OF SELF-SERVICE TECHNOLOGIES AND IMPACTS ON CUSTOMER
SATISFACTION AND LOYALTY: AN INVESTIGATION ON THE RETAIL INDUSTRY IN
FINLAND**

Master's Thesis
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ABSTRACT OF THE MASTER'S THESIS

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Subject Marketing	Type of the degree Master (MSc)	Time of publication July 18	Number of pages
<p>Abstract</p> <p>With the growth of customer-technology interaction in the retail industry, several interactive technologies have invented. Notably, for point-of-sales, self-service technologies are prominent. Mainly, the Self-Checkout Kiosk (SCOK) was the only SST that is employed globally. However, in the last five years, several eye-catching SST's emerged, Just-Walkout Technology (JWOT) is one of them.</p> <p>In literature, the service quality of SCOK's had studied extensively by researchers. The results depict it is a useful technology for achieving the satisfaction and loyalty of customers. However, there is still a gap related to the effectiveness of JWOT to achieve customer satisfaction and loyalty. Similarly, studies comparing self-service technologies and their impacts on customer behavior is also unexplored. Thus, this study aimed to compare the self-checkout kiosk and just-walkout technology and examined how these technologies influence customer satisfaction and loyalty.</p> <p>Nine dimensions of service quality of SST's are obtained from the theory, to compare both technologies and their corresponding impacts on customer satisfaction and loyalty. Based on the literature, the research framework was made, later validated through Structural Equation Modelling, by using Amos 26.0. The scales and items used in the survey have opted from earlier studies. The survey was measured on a sample size of 108 for JWOT and 117 for SCOK.</p> <p>The result shows five out of nine dimensions (speed, entertainment, customization, privacy, and superior functionality) are found significant for measuring the service quality of SCOK, whereas, for JWOT four dimensions (speed, entertainment, privacy, and control) are significant. Further upon comparison, the result indicates, just-walkout technology and self-checkout kiosk have almost identical positive impacts on customer satisfaction. However, there is one dimension of SCOK, superior functionality, which has a strong negative impact. Thus, the overall effect of the service quality of JWOT is more significant on customer satisfaction than SCOK. Similarly, the effects on loyalty are examined, depicting the influence of service quality JWOT is larger than SCOK.</p> <p>Further, to the best knowledge of the researcher, this study is the first study that empirically compared self-service technologies and analyzed their impacts on customer behavior. The findings highlighted in this research are of great importance both from a theoretical and practical perspective.</p> <p>Keywords Self-Service Technologies, Just Walkout Technology (JWOT), Self-Checkout Kiosk (SCOK), Service Quality, Customer Behavior, Enjoyment, Design, Aesthetic Appeal, Superior Functionality, Speed, Control, Reliability, Customization, Ease of use, Convenience, Security, Privacy, Factor Analysis, Confirmatory Factor Analysis, Structural Equation Modelling</p> <p>Additional information</p>			

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1 SELF-SERVICE TECHNOLOGIES

The term self-service technologies have been widely used for representing various self-operated technological services. Meuter, Ostrom, Roundtree, and Bitner (2000) defined it as “a technological interface that enables customers to produce a service independent of direct service employee involvement.” Technically, Self-service technologies refer to the machines, which customers can operate by themselves, objectively used by firms to decrease the customer-employee interaction, save organizational resources and consumer time (Featherman & Hajli, 2016). Active participation by customers is a preliminary requirement, which makes customers a co-producer in the delivery process of SSTs.

Further, SST's not only introduced automation in processes and eliminated human dependency but also tendered more control to consumers over the checkout process, influences customer experience and involvement. Customers are, as a result, more motivated and inclined towards using this technology (Lin & Hsieh, 2011). Similarly, the contribution of SST's in overall service quality has the potential of fulfilling the customer expectation and perceptions that would enhance customer satisfaction and loyalty. According to Meuter, Bitner, Ostrom, and Brown (2005), the radical development in self-service technologies have affected different industries, generally, by facilitating in organizing and delivering the service.

SST's have been part and parcel of the banking industry. For example, customers often prefer to use the ATM rather than visiting a bank for cash transactions. Similarly, several service sectors are using SST's, such as self-check-in machines at airports and hotels, ticket vending machines at railway stations, and pre-order kiosks in restaurants. Self-service technology, particularly in retail stores, has decreased the intangible costs and help customers save time (Dabholkar & Bagozzi, 2002). Also, globally, two SST's are in practice in the retail industry; self-checkout kiosk (SCOK) and just walk out technology (JWOT).

Recently in the USA, an eye-catching SST was introduced by Amazon, known as “just walk out technology” (JWOT) on its retail store in Seattle (Grewal, Noble, Roggeveen, & Nordfalt, 2020). JWOT is owned by Amazon, who introduced this SST by featuring

it in their new store named Amazon Go in the USA (Forbes, 2019), which opened on 5 December 2016. However, the usage was, in the start, limited to employees because it was still in the beta testing phase (Forbes, 2019). Almost a year after, on 22 January 2018, Amazon Go was opened for the public (Forbes, 2019). An amazingly positive response had observed by customers. Therefore, Amazon was thinking of expanding it in the USA by deploying in their other stores. In the future, they are also planning to sell it to other retailers and vendors (Forbes, 2020). A year later, after Amazon, Alibaba also launched a store, Tao Café, with similar technology (Medium, 2018). It is an employee-less and checkout-less technology enhancing customer convenience and facilitates them to carry out the purchase without stopping anywhere.

Further, this thesis expects JWOT can be the one as it eliminates the customer and cashier interaction. In this technology, customers experience “no checkout”; the only time they must interact with the system is while entering the store. It is a technology that just requires a smartphone, store application with Amazon account, and internet, which nowadays, almost everyone has, in Finland. This technology uses RFID at point of sales, and when a customer walk-out, the sensors send the receipt to the customer phone. With all its benefits, it is still an expensive technology as compared to other wireless technologies.

Self-checkout kiosk, an SST widely used in several industries and diminishes the customer-employee interaction. Mostly it is used by banks, but from the last two decades, it is also obtained by the retailers, as it turns out useful for decreasing labor costs and increasing co-production (Lin & Hsieh, 2011). Recently, some stores in Finland are using this technology without employee supervision, such as K-supermarket (Yle, 2017). Thus, it can also be modified to eliminate human independence just like just-walkout technology wholly. Besides, prior studies on the retail industry (Iqbal, Hassan & Habibah, 2018, Fatma & Ali, 2014) emphasized SCOK decreases the waiting time because it contains lesser space than traditional cash counters. Subsequently, more than two machines can be employed instead of one cash counter. Usually, the store uses four self-checkout kiosks (Iqbal et al., 2018). Further, in the retail industry, a variety of SST's are in practice. But there is no single technology that has been accepted everywhere and turned out to be a critical success factor (Chuawatcharin & Gerdri, 2019).

1.1 Finnish retail industry

Globally, the retail sector has been playing a significant role in economies of developed countries, the share of 5.5% in the US economy (Duffin, 2020), and 16.1% in the German economy (Koptug, 2019) is a clear indication of its vitality. Similarly, Uusitalo and Rökman (2007) believe that the Finnish retail market has impressive potential, as well, because of the oligopoly of two big groups, S-group and Kesko group. However, in 2002 a German retail chain 'Lidl' entered the Finnish market with ground-breaking low pricing, which has affected the growth of the two national retail chains. Lidl instilled the culture of highly discounted and low-price products among Finnish customers for whom, previously, the price was not the significant deciding factor while choosing a retail store for grocery (Uusitalo & Rökman, 2007). Customers are now more aware of pricing and prefer to do grocery on stores which offer more discounts and cheap pricing. Technology has contributed to it by making it possible to decrease the costs and make processes efficient and effective.

In the retail industry, self-service technology is not new, but an emerging technology, especially in Finland. In 2012, the first SST installed in the retail sector of Finland (Fujitsu, 2012) was a self-checkout kiosk (SCOK). Since then, retail chains have adopted SCOKs in stores, such as S-group and K-group (Fujitsu, 2018). He further theorized that the Finnish retail sector has a lot of potentials and occupies substantial grounds to progress in adopting SCOK. It is efficient and effective, decreasing the hustle and helping in avoiding long queues in rush hours. The top management of K-group added that one out of five customers use the SCOK option over traditional checkout, and weekly 400,000 get benefited from it (Yle, 2017). This study mainly focusses on retail grocery store of two big groups of Finland that has already installed SCOK in their stores such as K-group and S-group. These two groups have almost 82% of share in the retail grocery industry (Jürgensen, 2019). Among these two groups, S-group is the first one to adopt self-checkout technology. Initially, they installed SCOK only on their store named 'Prisma'. Recently they decided to extend it to its sister brand, Sale and Alepa, all over Finland (Fujitsu, 2018).

In a nutshell, in the retail, the success of an existing business relies upon offering high quality at a competitive price, that would be possible by automating the process and

decreasing costs such as labor cost by featuring SST's at point of sale. In developed countries, it is evident that labor cost is very high, which motivates businesses to introduce automated kiosks for saving resources, consumer time, and crafting an error-free delivery process. Moreover, the goal of the retail store is to have more satisfied and loyal customers, which depends on the service quality (Dabholkar & Bagozzi, 2002; Dabholkar, 1996; Fatma & Ali, 2014; Iqbal et al., 2018; Lin & Hsieh, 2011). Therefore, there is a need to investigate the impact of service quality of SST's on customer satisfaction and customer loyalty and determine which is more beneficial for retails.

1.2 Problem Background

Around the globe, many technologies are in practice in the retail industry. Specifically, at point-of-sales, several user-friendly technologies emerged that eases the methods of payments on standard cash counter such as mobile payment (Danske Bank, 2018) and QR code payment (News, 2018). Similarly, the technologies that eliminated the customer-employee interaction, known as self-service technologies, are also in practice globally as well as in Finland. Though SCOK is the only self-service technology, the retail industry of Finland is using. However, the researcher expects JWOT is more impactful and effective in Finland. Thus, it is necessary to determine whether JWOT is substantial or SCOK towards gaining customer satisfaction and loyalty.

1.3 Research Gap

Prior studies have empirically proved the impact of technology on service quality in retail. Generally, most of the studies emphasized the enhancement of SST's at point of sale as its service quality positively influences customer behavior (Dabholkar, Michelle, & Lee, 2003; Meuter et al., 2005). Some examined the impact of service quality of self-check-out kiosks on customer satisfaction and loyalty (Fatma & Ali, 2014; Iqbal et al., 2018). However, still, the impact of the service quality of JWOT is unexplored and unknown in the literature. Similarly, there is no previous study that depicts the significant dimensions of service quality of JWOT, which impulses customer behavior. Lastly, there is not single considerable research that examines the

impact of service quality of JWOT and SCOK on customer loyalty and satisfaction, later suggesting the most impactful technology. Thus, this research attempts to fulfill this gap by analyzing the service quality impacts of both technologies on customer satisfaction and loyalty and comparing it with each other.

1.4 Research questions and objectives

1.4.1 Research questions

This study has one main question that will be answered with the help of three sub-questions. As this study is comparative, thus, with the help of three sub-questions, the variance between self-checkout kiosk and just-walkout technology and intensity of their dimensions will be answered. The main research question, along with sub-questions, are as follow:

- In retailing, which dimensions of service quality effects customers to adopt just-walkout technology over self-checkout technology, by increasing their satisfaction and loyalty?
 - What are the dimensions of Just-walkout technology and self-checkout kiosk that significantly impacts on customer satisfaction and customer loyalty?
 - How just-walkout technology has more impact on customer satisfaction and customer loyalty than self-checkout technology?
 - What are the main differences between the impacts of self-service technologies, JWOT, and SCOK?

1.4.2 Research objectives

This research has set three critical research objectives that will contribute to acquiring the desired results. The objectives of the research are as follows:

- To study the technological differences between just-walkout technology and self-checkout kiosk.

- To identify the service quality dimensions that are crucial for the customer for just-walkout technology and self-checkout kiosk.
- To determine which technology is more effective and efficient for the retailing industry of Finland, in terms of customer satisfaction and customer loyalty.

1.5 Importance of research

This study will contribute to several theoretical and managerial aspects. It attempts to fill the research gaps and give a concrete basis to managers for adopting either SCOK or JWOT. The contributions of this study are the following:

- The focus of previous studies is broad, as the researchers (Dabholkar, 1996; Lin & Hsieh, 2011; Fatma & Ali, 2014) emphasized on development and testing of the measurement scales for service quality dimensions, that are crucial for self-service technologies, across the industry. However, this study will narrow down the focus from self-service technologies to only just-walkout technology and self-checkout kiosk by defining the dimensions which are crucial for them.
- Theoretically, as compared to SCOK, there is an insufficient number of studies on JWOT. Thus, this study will also contribute to the literature of just-walkout technology and attempt to explore the unexplored aspects such as retail advantages and disadvantages.
- The most important aspect of this study is its comparative nature as there is no prior study that has focused on determining which technology has a more significant impact on customer satisfaction and customer loyalty.
- A sufficient number of studies (Fatma and Ali, 2014; Iqbal et al., 2018) have examined self-service technology in the retailing industry. But in the demography, where the population avoids employee-less technological interactions (Iqbal et al., 2018). Therefore, the results of those studies cannot be valid for a society that prefers technological interactions such as Europeans, specifically Finland (Yle, 2017). Thus, the results will provide decisive insights to retail businesses operating in Finland or countries whose population have similar desires.

1.6 Methodology

The study will use quantitative methods. The population decided for the study is students of the University of Oulu, and due to lack of time and resources, a sample size of 200 respondents will be used. For sampling techniques, initially, to validate the survey from research experts, convenience sampling techniques is employed. Later for the collection of the large scale of data, a random sampling technique is used that will also facilitate in decreasing the biasedness. The survey with structured questions is used for collecting the data. It is distributed by email with the help of the University of Oulu. For determining the validity and reliability, factor analysis will be used. Further, structural equation modeling techniques will be used to test the hypotheses and answer the research questions

1.7 Research structure

This study comprises of 5 chapters. The following chapter introduces the research topic, highlighting the research significance, gap, questions, objectives, methodology, and structure. Chapter two will discuss the theoretical background of the primary phenomenon, measurement models of service quality, and provides a conceptual framework of this study. Chapter three elaborates on the research methodology and data analysis techniques. Chapter four discusses the results of the analysis. Following the results, hypotheses will be tested, and research questions will be answered. In chapter five, the conclusion of the research will be drawn in the light of results and prior findings. Following the conclusion, theoretical and managerial contributions are discussed. Chapter five also highlights the implications that hinder the study, along with future research suggestions.

2 THEORETICAL BACKGROUND

With the elevation of living standards over time, businesses have also leaped from the production of high quantity towards manufacturing better quality products. Another transition is observed; industries prioritizing the delivery of service packed with products, from just delivery of products. This discussion gives importance to, what is service and is service marketing is a distinctive topic to focus the research on it. Due to the diversification of services, researchers did not agree on a single definition.

Service is defined by Regan (1963) as “Activities, benefits or satisfactions which are offered for sale or are provided in connection with the sale of goods” (p. 57). In comparison, Payne (1995) explained it as, “An activity which has some element of intangibility associated with it, which involves some interaction with customers or with property in their possession and does not result in a transfer of ownership. A change in condition may occur, and production of the service may or may not be closely associated with a physical product” (p.34). Another definition is given by Kotler and Armstrong (1991), “A service is an activity or benefit that one party can offer to another that is essentially intangible and does not result in the ownership of anything. Its production may or may not be tied to a physical product” (p. 597). Conclusively, service consists of four characteristics which are, intangibility, inseparability, heterogeneity, and perishability. For customers, the features are not necessary. To them, the importance is what they perceived about the service and what they gained after the experience.

Further, with growing competition and a variety of options available to customers, gaining competitive advantage is key to success. Enhancing service quality with the help of technology is the first approach through which companies can acquire a competitive advantage. Similarly, in retail, the service quality has been improved by inducting several technologies in different processes such as SST at point-of-sale for the service delivery process.

2.1 Service quality

2.1.1 Definition

Quality is a Latin word derived from “Qualitas,” which means properties and characteristics. It is stated as “conformance to standards and specifications” and “fitness for use” by Crosby (1979, p. 87) and Juran and Godfrey (1998, p. 235), respectively. Kotler (2002) explained the term quality as the attributes and traits of firms’ products or services, which collectively fulfills the promised and implicit needs. Additionally, the initiator of research on the quality of service, Lewis, and Booms (1983, p. 98), explained service quality as a “measure of how well the service level delivered matches the customer’s expectations.” Whereas later, Parasuraman, Zeithaml, and Berry (1988) defined it as customers’ practical and sensible assessment of firms’ general excellence or supremacy is described as service quality.

2.1.2 Evolution of service quality:

It has been a long time since the service quality concept is under discussion in marketing literature. It gained the attention of scholars in the early 1980s, which continued in the 1990s. Mainly, scholars and researchers have studied service quality conceptually and examined it empirically in diverse industries, for example, Cronin and Taylor (1992) and Parasuraman et al. (1985; 1988). They explained it according to the scale they developed for its assessment. The diverse nature of service quality is the reason scholars have proposed various measurement scales (Dabholkar, 1996; Lin & Hsieh, 2011; Parasuraman et al., 1988). According to Seth, Deshmukh, and Vrat (2005), 19 models were published from 1984 to 2003. These measurement models were then divided by researchers into two schools of thought that are prominent in the literature of service quality: A nordic school of thought and an American school of thought.

Grönroos (1984), a follower of the Nordic school of thoughts, described the service quality in technical and functional terms. The technical dimension of service quality deals with the overall results, whereas the functional dimension indicates the relationship between customers and service providers (Grönroos, 1990). Scholars

supporting this school of thought used functional and technical dimensions to measure service quality. The critical characteristic of the Nordic school of thought is the customer's perspective. Although now the scope of research is changed, their focus is still on the customer's point of view.

However, the American school of thought focuses on the gap that is between the organization and the customer. For instance, the actual need of customers and what the organizations think the customers want. Parasuraman et al. (1985), a follower of the American school of thought, explained it as the difference between perceptions and expectations. Further, some researchers investigated both schools of thought and determined how they can be synchronized.

Sainy (2010) explored service quality from both school's perspective and concluded it as "a focused evaluation that reflects the customer's perception of elements of service such as interaction quality, physical environment quality, and outcome quality" (p. 52). His definition not only incorporates the five dimensions of the SERVQUAL scale (Parasuraman et al., 1985; 1988), which are tangibility, reliability, responsiveness, assurance, and empathy but also incorporates the technical and functional dimensions proposed by Gronroos (1984). Further, Sainy stated that there is no such definition and measures of service quality on which the majority of researchers and scholars have agreed upon. As service quality plays a crucial role in gaining a competitive advantage; therefore, it is vital for every industry that makes it complex to understand. Thus, the dimensions used for measuring service quality do not have to be similar for every sector. Consequently, several service quality measurement scales have been proposed, overtime, but there is no such measurement scale to which all the researchers have agreed. This debate has continued for the last three decades, where scholars have debated about the service quality dimensions and its measurement scales.

2.2 Service quality and self-service technologies:

Technology is a critical competitive component (Nelson, 2001) that helps in enhancing other crucial attributes such as quality of the products or services. In several industries, automation is being used at every step of the process. For instance, in the banking industry, almost everything starts with the interaction of technology and even ends on

it, such as from submitting cash to withdrawing cash technology. Similarly, technology has also improved the ways of interaction between the customer and the business. Such as it has made shopping possible and accessible from the home, office, or any part of the world. Particularly, in the retail industry, initially, the technology is employed to improve the supply chain management (Dabholkar, 1996). Such as automated inventory management systems, automatic pricing, ordering, and analysis. But, later, it has also transformed the customer and service-provider encounters, especially at the point-of-sale, by making it completely electronic.

In early research on service delivery methods, self-service has been highly acknowledged as several benefits are associated with it (Chase, 1978; Mills, Chase & Margulies, 1983; Lovelock & Young, 1979). Scholars (Dabholkar, 1996; Lin & Hsieh, 2011) regarded self-service as an essential tool for customer co-production (Bitner, Zeithaml & Gremler, 2010). Therefore, with time, several point-of-sale technologies are developed and then modified to enhance customer involvement and motivation. These electronic and entirely customer operated point-of-sales are known as self-service technologies (SST's).

Meuter et al. (2000) defined self-service technology as an interface that offers the customer to get a service independently without direct interference and involvement of employees. SST's not only facilitated in co-production of service but also helps the customer in co-creation of value (Bitner et al., 2010). Several benefits are associated with the incorporation of self-service technologies, such as improved customer experience, reduction in expenses such as labor costs, enhancement in retaining customers, and coping up with new technology (Fatma & Ali, 2014). Further, several industries incorporated self-service technology to enhance the customer experience. ATMs used by banks, automated check-in and checkout machines in the hotel industry, self-check-in the airline industry, internet services, self-kiosks such as digital photo kiosks and information kiosks, and self-payment systems at the gas station are the examples of self-service technologies.

Further, according to Fitzsimmons (2003), the SST has evolved the service-encounters, reducing the face to face interaction. He also conceptualizes the "evolution of self-service" steps from real life "face to face" customer-service provider interaction

to the technology-enhanced service encounters (see table 1). Several researchers (Anitsal & Flint, 2006; Hsieh, 2005; Dabholkar et al., 2003) believe the use of SST's makes the delivery process smooth, easy, and quick, that improves the customer perception about the service quality of business. Further, SST's have become a seamless technology and a significant trend due to which companies are incorporating it, to facilitate the customers with diverse modes of service delivery (Lin & Hsieh, 2011). Similarly, in retailing, its integration at point-of-sale has been an emerging trend from the last two decades (Inman, & Nikolova, 2017), which depicts its significance and impact-fullness in the improvement of service quality.

Table 1 Evolution of self-service technologies (Fitzsimmons, 2003, p. 444)

Service Industry	Human Contact	Machine Assisted Service	Electronic Service
Retail bank	Teller	ATM	Online banking
Grocery	Checkout clerk	Self-checkout stations	Online order/pick-up
Airline	Ticket agent	Check-in kiosk	Print boarding pass
Restaurants	Waiting staff	Vending machine	Online order/delivery
Movie theatre	Ticket sales	Kiosk ticketing	Pay per view
Book store	Shop assistant	Stock-availability terminal	Online ordering
Education	Teacher	Computer tutorial	Distance learning
Retail store	Checkout Clerk	Self-checkout station	Online shopping

Around the world, the retail industry has incorporated several SST's such as Self-Checkout Kiosk, Just-Walkout Technology, Facial Recognition Technology, and Mobymart (Amazon, 2018). As the focus of this research is the Finnish grocery retail industry, two SST's will be compared, self-checkout kiosk (SCOK), and just-walkout technology (JWOT). Consequently, suggesting the best self-service technology in terms of improving service quality contributing to customer satisfaction and customer loyalty. SCOK is currently used by the number of retails stores in Finland. However, JWOT is only used by Amazon in its stores in the USA.

2.2.1 Self-checkout kiosk

The self-checkout kiosk is an alternative method of traditional checkout. It was invented by David R Humble in 1984 (BBC, 2017), whereas Price Chopper Supermarket was the first retailer to install SCOK at point of sale in 1992(Inman & Nikolova 2017) and named it as “the service robot.” It is also known as self-scanning checkout. SCOK is a computer that helps the customer in performing all traditional checkout task by her/himself, more precisely, the customer holds the power of a co-producer. It facilitates customers in checking out without interacting with employees. According to BBC (2017), 200,000 units are being used in the world in 2013 and assessed that it would increase to 325000 until 2021. The increased number indicates the benefits associated with SCOK, such as decreased labor costs for employers and reduced checkout time for shoppers (Reynolds & Morrin, 2019).

In retailing, self-scanning checkout is a three-step process, “scan, bag and pay” (Grewal, Roggeveen & Nordfält, 2017; Inmana & Nikolova, 2017). Once the customer has collected all the products and reached the self-scanning machine, the first step is to scan all the products with the machine by using the bar-code scanner. The electronic interface automatically guides about each item, and where to place them after scanning. In the second step, after scanning all the products, shoppers place them in the shopping bag. In the last step, shoppers pay the bill and walk out with the shopping bag. As per observation and experience, the last two steps often get exchanged, some customers prefer paying first and then place products in the bag and walk out (see figure 3).

According to Inmana & Nikolova, (2017) when shoppers scan the product, SCOK give instructions of placing it on specific security scale that make sure shopper is not paying for less and taking more items with. For instance, scanning one pack of milk and placing two packs on a security scale. Further, when customer walk-out of the store, there are Radio-frequency identification (RFID) scanners than determine whether the product is being purchased or stolen. For example, if the product is still available in inventory and being taken out of the store, then the alarm rings. This process helps in maintaining security. Also, typically, a store deploys around four to six units of SCOK and one cashier supervisor, who not only maintains the security but also helps the

shopper if needed. Numerous benefits are associated with the incorporation of self-checkout kiosks in the retail industry.

Advantages of self-checkout kiosks

Cost-efficient

Self-checkout kiosks in a companies' perspective, reduces cost for the labor employed and is considered at times a replacement for the salesperson/cashier within a store. The number of employees required to achieve efficiency is less, and the service quality is maintained through the usage of self-checkout technology. The competitive advantage can be created by providing such technologically advanced services with few counter personnel handling multiple customers' lanes at the checkout. (Tung and Tan, 1998; Meuter et al., 2000)

Ease of access to promotions

The self-checkout kiosk offers screen images, prices, promotions, and other information made available, such as operation hours, exclusive deals. Loyalty cardholders can get benefits from the self-checkout without having to show the card to the cashier and understanding the benefits. (Tung and Tan, 1998)

A better sense of customer services

The self-checkout technology enables the customer to checkout without having to wait for a person to attend them. It gives the customer ease of use and gives a sense of controlled customer service (Collier & Sherrell, 2010). The features on SCOK provide a vibe to customers that they have more control over the service process, and the outcome is a result of their perceived control (Bateson, 1985b). It gives customers to evaluate the customer services based on real-time interaction of SCOK, the responsiveness of the machine, and user control (Zhu et al., 2007; Hoffman & Novak, 1996).

Still validates the human interaction

Studies are indicating that the self-checkout has not invalidated the human interaction. There are salespersons available to assist the customers if something goes wrong. Employees' support is also possible to use self-checkout kiosks in supermarkets (Anitsal & Paige, 2006). Human interactions, which are well-coordinated, are essential in the successful operation of the retail kiosk (Jennifer, 1995). There is the training given for that among the employees of the retail store, to be quick and efficient in their assistance, they must know the operability of the self-checkout kiosks. In this way, retailers can reduce possible failures in the use of SCOK by the customers.

Self-Delivery System

SCOK has given an alternative to the long waiting time and another option for delivery of the products purchased. Consumers are not just service consumers but co-operate in service delivery, thus adding value to service delivery. This active participation contributes to better-perceived service quality. (Anitsal & Schumann, 2007).

Disadvantages of self-checkout kiosks

Increase in Thefts

There is a level of trust shown by the retail store that it is allowing the customer to check out by scanning all the products themselves and not remove the labels and try to steal things. However, this trust is not blind, there are cameras involved, but that does not stop the lawbreakers. Due to the similar problems, Kmart (an American store) dispensed the self-checkouts as the customer theft rates were becoming too insistent (Herubin, 2003).

Technology Anxiety and Potential embarrassment

Not everyone is happy with the introduction of machines in the delivery process. Some people do not have enough awareness or education to use this advanced technology, or some people consider themselves too old to learn this new addition (Dean, 2008).

Technology anxiety is also a factor, which negatively affects the usage of SCK (Meuter, Ostrom, Bitner, & Roundtree, 2003). Similarly, some people are embarrassed to tell that they do not know how to use these SCOK's and could potentially out of their comfort zone.

2.2.2 Just-walkout technology

Just walk out technology (JWOT) is the most advanced form of self-service technologies, introduced by Amazon. Initially, Amazon deployed it in their convenient retail store named "Amazon Go," but later, it was also introduced in "Amazon Go Grocery" stores (Amazon, 2020). Amazon Go sells a variety of ready to eat products, whereas Amazon Go Grocery offers grocery items such as ingredients required for preparing dinner and lunch. Also, due to the service delivery mechanism, JWOT is known as "scan and go" (Grewal et al., 2020), and "checkout less" (Amazon, 2018). Furthermore, a smartphone is nowadays becoming a fundamental requirement for all advanced technologies.

For shopping from a store using JWOT, the customer just needs a "smartphone, store account, and the store app" (Grewal, Roggeveen, & Nordfält, 2017). Thus, to enter the store, customers need to scan the smartphone. Once the customer moves in the store, his/her actions are observed with a variety of technologies. As a result, every item customers collect/picks from the shelves will be added to the virtual cart, but if they changed their mind and placed it back, it will be removed from the cart. Items are tracked with the help of a number of technologies related to self-driving cars such as artificial intelligence, computer vision, deep learning, and sensor fusion (Grewal et al., 2017;2020). Once customer walk out, they are charged and sent an automatically generated receipt (Figure 2). Also, if they find any discrepancies in the receipt, they can report it in the store app or can call the helpline. Further, customers can also give feedback from the app or by calling on the help center about the service.

Amazon categorized these stores as a convenient store and, primarily, launched only in the USA (Amazon, 2018), but they planned to share it with other retailers as well as industries. Due to its enormous potential, several retailers, vendors, and enterprises are interested in buying. Recently, Amazon created an official sales website and call portal

for vendors (Business Insider, 2020). The first buyer was an airport vendor known as OTG (Business Insider, 2020). Similarly, retailers of technologically advanced countries such as Finland might be interested in purchasing this technology. Therefore, the need to examine customer behavior towards this technology is increasing.

It's now been four years since Amazon introduced JWOT. But, still, not many researchers have examined its service quality, as compared to the self-checkout kiosk. Further, the following part will highlight some significant advantages and disadvantages that are attached to JWOT.

Advantages of just-walkout technology

Disruption free

Standing in long waiting lines for entering the store or at the check-out counter is the primary concern of several customers as they want the service without any disruption. For shopping from a store using just-walkout technology, a shopper just have to interact while entering to scan the mobile. After that, the shopper does not have to interact with anyone for anything. This mechanism increases the speed of the buying process in retail stores (Inmana & Nikolova, 2017).

Time Efficiency

Undoubtedly, the most significant benefit attached to just-walkout technology is its time-saving nature. This technology provides interactionless shopping, which allows the customers to quickly walk in, grab the products, and checkout without any interference. Such as standing in queue for buying an item at the cash counter of self-checkout kiosks (Tung and Tan, 1998; Meuter et al., 2000). Amazon Go was an ideal store near highways and offices, as shoppers just want a quick process of buying food and drinks. Ideally, a veteran shopper spends 30 seconds in shopping from the store that has employed just-walkout technology (Business Insider, 2020). Further, in today's world, this technology goes hand in hand with busy people who want to complete each process quickly.

Disadvantages of just-walkout technology

Privacy

JWOT relies on the sophisticated system of data gathering that includes several machine learning cameras and artificially intelligent sensors that keep track of the shopper. Whatever they pick-up, even after putting it back, the system stores the information in the cloud. Further, when shoppers make an Amazon account, they commit to sharing personal information, financial information, and shopping information with them (Inmana & Nikolova, 2017). Thus, to stimuli your wants, they can better customize the offering for customers, who can unintentionally get motivated for more spendings. Similarly, while forming the account, often, stores have a clause for selling the information, to which the customers do not pay attention. It has made shoppers vulnerable far more than a decade ago (Grewal et al., 2020).

Job Scarcity

Though technology adoption has increased the effectiveness and efficiency, it has also diminished many jobs and made people unemployed. Further, it also gives pleasure feelings to the shoppers, but adopting this technology would slowly reduce the in-store positions, which could be the cause of joblessness (Grewal et al., 2020).

Lack of Interaction

Traditionally, it is observed many people felt good and laugh while interacting with cashiers at the cash counter. As this technology eliminates human interaction, several customers find it hard to buy items in bulk (Grewal et al., 2017). Also, it increases the isolation, which is nowadays a big reason for depression and mental illness, especially in Finland. Thus, it would be a significant disadvantage attached to JWOT.

Cost

As compared to other self-service technologies, it uses a comparatively more sophisticated and extensive system that includes artificial intelligence, machine

learning camera, internet of things, and several human detecting sensors. Thus, it costs much more than the other SST's. Similarly, its maintenance is also expensive (Inmana & Nikolova, 2017).

2.2.3 Measurement of service quality of SST's

A service is marketed according to its performance (quality), purchased by the customer, which will be the cause of their high spending (Parasuraman et al., 1991; 1988). Service quality is a core factor for marketing. Therefore, several researchers have attempted, in last three decades, to develop constructs and tool which help researchers as well as businesses in measuring it (Parasuraman et al., 1988; Dabholkar, 1996; Lin & Hsieh, 2011). Quality is a critical concept for gaining customer satisfaction and customer loyalty. Thus, most of the theory is focused on it. Further, the interest of scholar's increases in service assessment after the results demonstrate; perceived service quality impacts satisfaction, and altogether they influence the re-patronage and customer behavior (Mittal & Kamakura, 2001).

As the industry is diverse, several service quality measurement scales are proposed, but there is not a single universal tool for measuring service quality. There are some scales that are utilized and considered fundamental for developing new ones. Such as in literature, SERVQUAL and SERVPERF are the most popular scales, but, in the measurement of self-service technologies, SSTQUAL is more often employed. Therefore, the following part will review and assess these three scales, theoretically and practically, in a service quality measurement context. Due to continuous advancement in self-service technologies, some other dimensions should also be considered. Therefore, for measuring the service quality of self-service technologies, this study will adopt additional dimensions of service quality related to the study in addition to the SSTQUAL.

SERVQUAL

SERVQUAL is a scale that is used by the majority of marketing researchers to create new scales. It is developed by Parasuraman and his fellows (1988) to improve the previous scale known as the Gap model (Parasuraman et al., 1985). Gap model has ten

constructs and five gaps, but the fifth gap is considered as the function of gaps one to four. Later, in 1988 the fifth gap became the reason for developing the SERVQUAL scale, which evidently was and still is, the foundation of every scale. This scale measures the gap between customer expectations and customer perceptions related to service quality.

Moreover, this new scale has five constructs, in which 22 items are divided. These constructs are tangibility, reliability, responsiveness, assurance, and empathy (see table 2). The author used this scale to examine service quality in various industries such as the banking sector, machines repair and maintenance company, and credit card firms. Thus, to test the scale, the respondent's data was collected using a survey. In the survey, customers were asked about the expectations and perceptions regarding their experience, according to the five dimensions. In the Gap model, ten dimensions are used for measuring service quality, whereas SERVQUAL uses 5. Assurance and empathy, dimensions of SERVQUAL, are formed after merging the seven dimensions of the Gap model, which are communication, credibility, competence, courtesy, access, and understanding/knowing the customer. Also, the remaining three dimensions of the Gap model, tangibles, reliability, and responsiveness, are taken as it is, in SERVQUAL.

Further, the two statements were asked against each item; one statement is related to the expectation of customer experience, which was general, whereas the other one is about their perception of a specific business. The statements predicting tangibility are about the aesthetic appeal of equipment, physical facility, and employee, according to the nature of service. Reliability statements investigate firms promising nature, after-sale services, and query handling system. Responsiveness statements examine the firms helping nature, speed of service, and efficiency of responses associated with customer requests. Statements of assurance depict firms' employees are well equipped with up to date knowledge and help customers in a friendly way to gain their trust and confidence, which is also vital for their satisfaction and loyalty. Similarly, the assurance statements determine whether service providers acknowledge the trustworthiness of employees. The last construct, empathy, is associated with the firm's nature of providing attention and care to customers individually, from all the

employees. Also, the empathy statements determine whether the firm's opening hours are convenient to the customer.

Further, according to Bebeko (2000), SERVQUAL is considered an established and effective scale for service quality measurement across the industry. Several studies have supported its validity and reliability by empirically testing it in different service sectors and aspects. The scholars utilize this scale either in its original or in a modified form. The modification of this scale is done according to the context and settings of the research. A study conducted by Lam and Zhang (1999), for instance, empirically tested the instrument for measuring the quality of service in the travel sector of Hong Kong, and the results supported the scales. Another similar study was conducted by Ryan and Cliff (1997) to examine the service quality of travel agencies in Newland. The study also results in supporting the SERVQUAL scale.

Table 2 Service quality models and constructs

Authors	Models	Constructs
Parasuraman et al (1988)	SERVQUAL	Tangibility, Reliability, Responsiveness, Assurance, Empathy
Dabholkar (1996)		Speed, Ease of use, Reliability, Enjoyment, Control, Attitude, Need
Lin & Hsieh (2011)	SSTQUAL	Functionality, Enjoyment, Security / Privacy, Assurance, Design, Convenience, Customization
This research		Enjoyment, Superior Functionality, Aesthetic Appeal / Design, Ease of use / Convenience, Speed, Control, Customization, Reliability, Privacy / Security

Further, researchers have also found that three out of five dimensions of the scale that can be replaced. Liljander and Strandvik (1992) and Smith (1995) independently found that the instrument cannot be used to measure service quality at a global level. Also, the role expectation plays in service quality is the core (Cronin & Taylor, 1992), but its usage is unclear in this instrument. Even the scale lacks in providing theoretical support and concrete justifications (Cronin & Taylor, 1994; 1992; Parasuraman et al., 1988; Brady et al., 2002) for the performance gap (expectations). Similarly,

researchers also criticized the conceptualization and operational value of this scale (Cronin & Taylor, 1992; Babakus & Boller, 1992; Teas, 1993) and agreed on the need that a new scale, which should be developed on the basis of performance measures of service quality (Bolton & Drew, 1991; Churchill & Surprenant, 1982). Considering this need, Cronin and Taylor (1992) offered the SERVPERF scale that weighs only the perceptions of service quality provided by service providers.

SERVPERF

SERVPERF, a modified version of SERVQUAL, is based on the perceptions of the customers. Methodologically and conceptually, it is more enriched than SERVQUAL. The difference in results measured by this scale is significant in comparison to SERVQUAL. Also, this instrument has almost 50percent fewer items than the scale it is derived from. It uses a single item scale used to measure the service quality, due to which it gets substantial support and attention over SERVQUAL by the scholars, with time (Babakus and Boller, 1992; Churchill and Surprenant, 1982; Boulding, Kalra, Staelin and Zeithaml, 1993). Practically, several industries, such as retail banking, entertainment and amusement industry, fast food, traveling, and hoteling industry used SERVPERF to examine their performance (Jain & Gupta, 2004; Zhou, 2004; Lee, Lee & Yoo, 2000; Luk & Layton, 2004), making the scale more lethal and superior than SERVQUAL. Apart, SERVQUAL and SERVPERF are developed to measure service quality of human interaction (customer and employee).

Considering the measurement of service quality, two areas where researchers should emphasize and focus are, customer in-store experience and customer merchandising experience because as the world evolved, the technology has replaced humans (Westbrook, 1981). Individually, in retail, the cash counters are replaced by self-service technologies. Therefore, the service quality scales should also measure the human-technology encounter rather than just human-human interaction. Considering the capability of the scales, SERVQUAL and SERVPERF, the results of measurement of human-technology are not significant. Therefore, due to the immense induction of technology in several industries, a scale to measure human-technology interaction was critical in the mid-1990s.

Later, several scales were developed by researchers for measuring service quality of customer-technology interaction; one of them was proposed by Dabholkar (1996). The majority of the scales developed by researchers between 2000 to 2010 are limited to the e-commerce industry (Lin & Hsieh, 2011). But for the measurement of service quality of self-service technologies, no significant scale has been developed after Dabholkar. Therefore, considering the need for a scale that measures service quality of SST's, Lin and Hsieh (2011) proposed SSTQUAL.

SSTQUAL

To examine the service quality of the customer-employee encounter, SERVQUAL is utilized by researchers as a foundation. Contrary to it, researchers (Parasuraman, Zeithaml & Malhotra, 2005) argued that the process of customer assessing technologies and technological interactions significantly differs from the process of customers' assessment of customer-employee interaction. Therefore, for measuring service quality of human-technology interaction, several constructs and scales have been developed across the industry (see table 3). Still, no scale specialized in determining the service quality of SST's before SSTQUAL. Dabholkar (1996) attempted to measure the self-service technologies but did not able to provide a concrete scale that could apply to all SST's across the industry. Later, Lin and Hsieh (2011) proposed a scale, specifically, for measuring service quality of SST's.

Further, initially, the scale used seventy-five items for determining service quality. But through the subject matter expert review technique, researchers screened out almost half of the items and decreased the item count from seventy-five to thirty-seven. Then, exploratory factor analysis is employed to check the factor loading by using principal component analysis (PCA) and varimax rotation. The items are further decreased to twenty-seven items and loaded on seven components (dimensions). In the next screening phases, they employed confirmatory factor analysis for further refinement of the scale's psychometric properties and later tested it. After a four-step evaluation, twenty items and seven dimensions (table 3) are finalized for SSTQUAL. Soon after, some researchers (Radomir & Nistor, 2012; 2014; Fatma & Ali. 2014; Iqbal et al., 2018) have also tested it empirically and found significant results.

Table 3 Scales for measuring service quality of customer-technology interactions (Fatma et al., 2014)

Studies	Model	Context	Dimensions
Yoo and Donthu (2001)	SITEQUAL	Shopping site	Ease of use, aesthetic design, processing speed, security
Lociacono, Watson and Foodhue (2002)	WebQual	Website	Performance, access, security, sensation, information
Janda, Trocchia, and Gwinner (2002)	IRSQ	Online shopping	Performance, access, security, sensation, information
Wolfenbarger and Gilly (2003)	eTailQ	online shopping	Web site design, fulfillment/reliability, security/privacy, customer service
Parasuraman, Zeithaml and Malhotra (2005)	E-Squal	Online shopping	Customer service, web design, assurance, order management
Collier and Bienstock		Online shopping	Customer service, web design, assurance, order management
Cristobal, Flavian, and Guinaliu (2007)	PeSQ	Internet service	Customer service, web design, assurance, order management
Lin and Hsieh (2011)	SSTQUAL	Self-service technologies	Functionality, enjoyment, security/privacy, assurance, convenience, design, customization

Initially, Radomir and Nistor (2012; 2014) examined the service quality of SST's in the Romanian banking sector by using SSTQUAL. From results, they found five constructs on which customer perceptions are based. Image is the first dimensions, formed by combining two dimensions, assurance, and design, of SSTQUAL. They also found that the items of convenience and customization have the same functionality and properties. Therefore, they merged them and named the dimension as 'convenience.' The remaining constructs of SSTQUAL are used and validated as they are, but some of their items were exchanged. As a result, the scale shrunk to five dimensions and eighteen items. For further refinement of scale, researchers conducted a study that uses a highly educated population as a respondent. The study depicted that two constructs,

image, and convenience had a similar scope. Therefore, they were merged, forming a new dimension, named as DESCONASU. After empirically testing, the new scale is formed that has four dimensions and 14 items. Further, this scale is also employed by scholars to measure the service quality of SST's in the retail industry.

Recently, a study examined the validity of SSTQUAL in the retail sector of Pakistan, which resulted in positive (Iqbal et al., 2018), but upon factor analysis, some items are eliminated. Similarly, Fatma and Ali (2014) also empirically tested the scale to examine the SST service quality in the retail sector of Turkey. Though, their research has supported the scale but not entirely. They found that the two constructs, security/privacy, and customization, are not wholly fit for measuring SST service quality in the grocery store. Further, some researchers (Kumar & Mittal, 2015; Considine & Cormican, 2016) also examined the reliability and validity of SSTQUAL by replicating and duplicating the constructs in different sectors and contexts.

Determinants of self-service technologies

In this study, the base model used for determining the service quality of SST's is SSTQUAL, proposed by Lin and Hsieh (2011). SSTQUAL is specifically designed to validate the service quality of self-service technologies. However, according to the context, the items of the determinants are often included, excluded, and exchanged as separate constructs (Kumar & Mittal, 2015; Considine & Cormican, 2016; Radomir & Nistor, 2012; 2014). In technology and e-retail context, several constructs are used in a different context and turned out effective (Balaji & Roy, 2017). Therefore, nine dimensions of service quality of SST's are obtained from prior studies. Thus, this study will have nine independent variables and two dependent variables. Further, the definition of each independent variable, along with the previous findings on its relations with customer satisfaction and loyalty, is explained in the following part.

Enjoyment

According to Langeard, Bateson, Lovelock, and Eiglier (1981), playing and operating machines give a feeling of enjoyment and fun to a group of people. Similarly, a study on technology by Davis (1989) depicted customers value products which they perceive

as fun to use. Therefore, enjoyment in SST's refers to the degree of pleasure and excitement that customers feel while and after interacting with SSTs (Lin & Hsieh, 2011; Dabholkar, 1996).

Many studies have examined the impact of enjoyment of technology. For instance, Chen, Clifford, and Wells (2002) found enjoyment as a crucial variable in determining the entertainment function of information technology. Similarly, researchers (Kim, Kim, Moon, & Chang, 2014; Lin & Hsieh, 2011) examining the impact of service quality of SST's, illustrated its significance in measuring customer behavior (satisfaction and loyalty). Further, the study conducted by Fatma and Ali (2014) also emphasized that enjoyment is a significant dimension of SCOK that positively affects customer satisfaction. In pursuit of finding the relation of this dimension with customer loyalty, Iqbal et al. (2018) found it has more impact on gaining loyalty than behavioral intentions. However, no research has measured the impact of enjoyment on customer satisfaction and loyalty for JWOT. Similarly, it is still unclear that either the enjoyment provided by SCOK is more impactful on customer behavior or JWOT. However, the researcher believes, the enjoyment offered to customers by JWOT has more impact on customer satisfaction and loyalty than SCOK. Thus, this research will attempt to find which technology which provides more enjoyment, contributing to customer satisfaction and customer loyalty.

Further, a total of 3 items are used to measure this dimension, which is taken from two notable articles. Two items are taken from Lin and Hsieh (2011), whereas the third item is adopted by Kim et al. (2014).

Superior Functionality

Superior functionality refers to the advanced characteristics related to the functions (Lin & Hsieh, 2011), whereas Balaji and Roy (2017) defined it as an enhancement of technological processes. In SST's, functionality indicates towards the improvement of the interface, functions, and features over other service delivery options.

Very few studies have employed this dimension to measure service quality. For instance, a researcher conducted by Balaji and Roy (2017) found that functionality

strongly influences continuous purchase, that depicts customer is satisfied. Similarly, another study attempting to measure the service quality of SCOK in grocery retail stores of Turkey by Fatma and Ali (2014). The researchers found functionality as a significant dimension for SCOK. However, there is no previous that has studied JWOT using this dimension. Further, as Roger (2003) hypothesized that customers believe new technology has improvements, and more benefits are attached to it, which collectively affects their trust level and makes them think it as a high service quality indicator (pp. 14-25). Thus, researchers believe JWOT has superior functionality than SCOK and will have more effect on customer satisfaction, as well as customer loyalty.

This dimension consists of four items taken from two studies. The first three items are taken from the research conducted by Balaji and Roy (2017), whereas one item is adopted by Lin and Hsieh (2011).

Aesthetic appeal/design

Aesthetic appeal refers to the extent to which customer feels the product or technology as tempting and attractive (Haris & Goode, 2010; Balaji et al., 2018), whereas design is referred as the overall layout of the product/technology (Lin & Hsieh, 2011)

Both dimensions have been extensively used for measuring service quality of e-commerce and technology, leading to gain customer satisfaction and customer loyalty. For instance, Haris and Goode (2010) conducted a study on e-servicescapes and found that aesthetic appeal contributes to building trust, which leads customers towards behavioral intentions (repeat purchasing). Another study conducted by Balaji and Roy (2017) on retail marketing for determining the impact of the internet of things on customer repeat purchasing. Their research depicts aesthetic appeal is an essential indicator of value co-creation that strongly motivates customers repurchase intentions. Similarly, Moon, Park, and Kim (2015) stated there is an extant theory available that demonstrates the significance of aesthetics attributes in appealing and influencing customer behavioral intentions (Moon et al., 2015; Truong, Klink, Fort-Rioche, & Athaide, 2014).

Similarly, several studies already attempted to measure design. The studies found contradictory results. For instance, a study performed in Romanian banking found that design should not be measured solely as its items in factor analysis did not load completely (Radomir & Nistor, 2012; 2014). Therefore, they merged it with another variable named assurance and convenience and formed a new dimension DESCONASU. Then this new dimension significantly assists in measuring service quality.

In contrast, a study conducted in the retail grocery market of Turkey by Fatma and Ali (2014) emphasized that design is an essential dimension of self-service technology to measure its service quality. Further, the study also demonstrated that design positively and significantly influences customer satisfaction and customer loyalty. Another study by Iqbal et al. (2018) explained that design as a strong dimension for measure service quality of SST. Similarly, Zhu, Nakata, Sivakumar, and Grewal (2013) concluded the design of SST attracts the customer and motivates them to experience. Thus, it should be simple, appealing, and engaging.

In addition, as the product looks tempting and attractive because of its layout or representation, in other words, design. Thus, the researcher believes these two dimensions are overlapping. Therefore they should be measured together as a single dimension. Further, for its measurement, three items are used. From which, one item is adopted from the scales used by Balaji and Roy (2017) to measure aesthetic appeal, whereas the other two items are taken from the scale designed by Lin and Hsieh (2011) to measure design.

Ease of use/convenience

It is defined as the extent of comfortability customer thinks about the system interface (Collier & Sherrell 2010; Dabholkar, 1996; 2014; Davis 1989), whereas convenience is defined the by Lin and Hsieh (2011) as “customer’s ability to find and facilitate an SST transaction with the least amount of time and effort.”

Several studies have emphasized a technology that is easy to use supports in achieving customer satisfaction and loyalty, as well. Such as, a survey conducted by Balaji and

Sanjit (2017) found an ease of use is a strong dimension for measure service quality of technology. As when a system/machine is easy to use, it increases the value for the customer and leads the business to achieve the satisfaction of the customer (Radomir & Nistor, 2012; 2014). Similarly, Dabholkar (1996) found that ease of use of self-service technology has strong positive effects on customer intentions of repurchasing, which represents customer loyalty (Iqbal et al., 2018).

In contrast to the ease of use, scholars attempting to find the significance of convenience found substitute results in the context of service quality of technology. Scholars (Collier & Sherrell, 2010; Fatma and Ali, 2014; Iqbal et al., 2018) employed convenience as a dimension of service quality that facilitates in achieving satisfaction and loyalty of customers. However, a study conducted by Radomir and Nistor (2012; 2014) attempted to measure the service quality of SST by using convenience. The researchers found convenience is not a definite dimension and is similar to design. Therefore, they should be measured together.

Similarly, the researcher also believes they are somewhat similar for self-service technologies (SCOK and JWOT) and addressing similar outcomes. Therefore they will be measured together. Three items are used to measure them. Two of them are taken from the scale developed by Balaji and Sanjit (2017) to measure ease of use, and one is adopted from Lin and Hsieh's (2011) scale designed to examine convenience.

Speed

Speed is stated as the time taken in the completion of the transaction (Langeard et al. 1981). In the context of SST, it refers to the ability of a system that helps customers in performing operations in a short period as compared to the traditional method (Collier & Sherrel, 2010).

In a study on technology-based self-service, Dabholkar et al. (1996) found that speed does not have a significant positive impact on the service quality of self-service. Similarly, later in another study on SST's, Dabholkar and Eun-Ju (2003) found speed has a positive effect on customer behavior but not significant. However, in several qualitative studies, respondents emphasized that speed is an essential driver of

customer satisfaction (Howard & Worboys, 2003). Further, some early studies (Anselmsson, 2001; Meuter et al., 2000; Lovelock & Young, 1979) on SST's also found speed is a significant dimension for customers to prefer self-services such as self-scanning over traditional checkout on retail stores. Thus, the researcher believes speed plays a crucial role in motivating customers' behavior, such as customer satisfaction and loyalty. Therefore, it should be measured because the primary goal of adopting self-service technology is to save resources and time. Further, to measure this dimension three-item scale is adopted from the study conducted by Collier and Sherrel (2010).

Control

Control is defined as the power one feels to have on the process on service encounter (Dabholkar et al., 1996). In contrast, Collier and Sherrell (2010) explained it as “a belief in one's ability to command and exert power over the process and outcome of a self-service encounter.” (p. 492). For SST's, it is defined as the authority of a customer to order and command the self-service system for processing and getting outcomes.

Prior theories indicate that the control of technology influences service quality (Dabholkar, 1996; Dabholkar & Eun-Ju, 2003). Similarly, numerous studies have utilized this construct for studying the human-technology interaction (Bezjian-Avery, Calder, & Iacobucci, 1998; Lombard, & Snyder-Duch, 2001) and concluded it is useful in influencing customer behavior. Further, a recent study by Collier and Sherrel (2010) depicts control construct has a positive and significant impact on customer repeat patronage with the help of mediators, but Dabholkar and Sheng (2009) research shows control directly influence customer repurchase intentions. Thus, the researcher strongly believes control will be a critical dimension in determining the influence of SST's on customer loyalty and customer satisfaction.

Customization

Customization indicates the ability of the system to mold itself according to personal requirements and transactions (Lin & Hsieh, 2011). It motivates customers for co-

production. In SST's context, it is defined as the ability of technology to personalize according to individual needs.

A number of studies conducted before, to examine the impact of customization on technology-encounter in different settings, but the results are not the same. For example, a researcher attempted to investigate the impact of self-service technologies on customer loyalty and satisfaction in the grocery industry of Turkey (Fatma and Ali, 2014). The scholars found that customization provided by SST has no significant impact on service quality. Thus, it does not influence customer satisfaction and loyalty. Similarly, Radomir and Nistor (2012; 2014) also emphasized that customization is not a strong dimension of SST, due to which they merged it into convenience and design to form a strong significant dimension.

However, a study by Mathwick, Wagner, and Unni (2010) found that lack of customization in electronics services not only decreases the strength of relationship with the customer, but also impact negatively on service quality. Moreover, the researchers emphasized that customization is imperative for improving the service quality of technology-customer service encounters (Mathwick et al., 2010). Similarly, some other studies also employed customization for examining service quality of SST and obtained significant results such as a study by Iqbal et al. (2018). They elaborated customization as an essential dimension of SST for the retail industry of Pakistan, as customers prefer customized interfaces. Therefore, the researcher also believes customization is a critical dimension in SST's. Further, JWOT provides more customization than SCOK and have a significant positive impact on customer satisfaction and loyalty.

Besides, to measure this dimension, a three-item scale is adopted. The scale is taken from the measurement scale designed by Lin & Hsieh (2011), specifically for measuring service quality of SST.

Reliability

Reliability is defined as the ability of a machine to perform confidently, properly, and appropriately as it is conveyed and promised to the customer (Dhabholker, 1996,

Parasuraman et al., 1988). In SST's, reliability means the ability of the system to complete the described and designated task flawlessly and correctly.

According to Wolfinbarger and Gilly (2003), in technology-encounters, flawless operations and functions of technology have a significant impact on service quality. A study performed by Dabholkar and Eun-ju (2003) revealed that the reliability of the electronic interface (SST) positively influences customer motivation and behavior. Similarly, Evan and Browns (1988) explained in earlier research that reliability is a vital dimension as it motivates customers to use self-operated technologies. Further, customer service quality evaluation improves with the improvement in reliability of technology (Zeithaml, Parasuraman, & Malhotra 2002) as it positively influences customer satisfaction and loyalty (Fatma & Ali, 2014). The researcher agrees with the afore-mentioned scholars. Therefore, this study will also attempt to uncover the reliability of SCOK and JWOT and measure their impacts on customer satisfaction and loyalty.

In order to measure the reliability, a three-item scale is used. Two items are adopted from the study performed by Dabholkar and Eun-ju (2003), whereas the researcher introduces one item after pilot testing.

Security/privacy

Security refers to the risk of fraud with customers, whereas privacy determines the safety of personal information of customers. In SST context, security means the transaction and transaction history of customers stays safe, and privacy refers to the ability of a system to keep all information private, inaccessible, and confidential.

Customers prefer systems where they not only co-produce but also have less or no risk of fraud and external intervention to their personal information. Therefore, security/privacy is an essential determinant of SST (Lin & Hsieh, 2011) and considered critical by Parasuraman et al. (2005) for measuring service based on technology. Several studies (Hoffman, Novak, & Peralta 1999; Wolfinbarger & Gilly, 2003) provide evident results related to the significance of privacy and security for the evaluation of technological encounters. Further, due to the significant inclusion of

advanced technology in the retail industry, customers' foremost concern is the privacy and security of their information (Inmana & Nikolova, 2017). Further, according to researchers (Bowie & Jamal, 2006; Pan & Zinkhan, 2006), businesses that have a reputation as safe and trustable have a competitive advantage. In contrast, if businesses do not appropriately address security and privacy, it impacts adversely on the customer repeat buying (Eastlick, Lotz, & Warrington, 2006). Similarly, Inmana and Nikolova (2017) also emphasized on the measurement of this construct for retailers if they are using technological encounters. Likewise, the researcher also believes that security and privacy is an essential dimension of SCOK and JWOT and facilitates in motivating customers for using technology-encounters.

Thus, to measure the privacy/security provided by SST's and its impacts on customer behavior, a three-item scale is used. Two items are adopted by Lin and Hsieh's (2011) study, whereas the researcher introduces one item after pilot testing.

2.3 Customer Satisfaction

In marketing literature, customer satisfaction is considered as one of the foremost vital concepts. The long-term goal of every business is to satisfy customers, as it influences repeat patronage, profitability, and loyalty (Kim, Li, & Brymer, 2016). Therefore, it should be examined regularly. In literature, it is defined and conceptualized by using different approaches in a different context. The accomplishment of customer expectations is the basis of the most famous approaches used in the marketing literature (Kim et al., 2016).

Since the 1970s, the disconfirmation-paradigm was considered as a base model for the development of new scales. An early study on the disconfirmation-paradigm indicates satisfaction depends upon the "size and direction of disconfirmation experience" (Churchill & Surprenant, 1982). They proposed four constructs for the disconfirmation paradigm, which are expectations, performance, satisfaction, and disconfirmation. Disconfirmation is the result of the difference between perceived expectations and perceived performance. They are either confirmed (performance of product/service is up to the expectations), negatively disconfirmed (performance of product/service is

lower than expectation), or positively disconfirmed (performance of product/service exceeds the expectation).

Further, when customer expectation is negatively disconfirmed, dissatisfaction occurs. So, they defined customer expectation as “an output, resulting from the customer's” pre-purchase comparison of expected performance and increased cost” (Churchill & Surprenant, 1982, p. 495). The relationship of the four constructs has been confirmed by the earlier studies (Olson & Dover, 1979; Oliver, 1980).

In contrast, some studies on customer satisfaction referred it as an emotional responsive construct originates from cognitive evaluation process in which customer evaluates the service received with the service attaining costs (Woodruff, Clemons, Schumann, Gardial, & Burns 1991; Rust & Oliver, 1994). According to Khurana (2013), it is a tender process that depends upon the customer evaluations generated from the utilization process of product/service and expressed at any time during consumption. In the meantime, it is defined and conceptualized in various ways, such as Brady, Cronin, and Brand, (2002) referred it as customer's opinion related to the level of customer expectation fulfilled, regarding a specific purchase encounter. Another approach is used by Day (1984) to define customer satisfaction, who explained it as “a post-choice evaluative judgment concerning a specific purchase selection” (p. 499). On the other hand, it is described as “consumer's judgment that a product, or service feature, or the product or service itself, provides a pleasurable level of consumption-related fulfillment, including levels of under or over fulfillment”, by Oliver (1997, p. 8).

As the researchers were continuously concentrating on the period when customers evaluate the service and determine the satisfaction, a new thought emerged. It suggests the focus should divert towards the comparison of experience and perceptions of customers, related to the outcome of service. For instance, Setó-Pamies (2012, p.1262) stated, customer satisfaction is a “process of comparison” in which customers compare the result of the service with the specified standards (such as expectations) to evaluate the service quality. Thus, they become satisfied or dissatisfied. This view of understanding satisfaction is somehow related to the disconfirmation paradigm. Some scholars also equaled this phenomenon with different customer's feelings. For

example, Kotler (2000) described it as a pleasure feelings, whereas Hoyer and Macinnis (2001) associated it with cheerfulness, approval, and amusement.

All the perspective discussed above refers to customer satisfaction as a post-purchase behavior. However, it can also occur even without a purchase or before purchase (Giese & Cote, 2000). For instance, Olander (1977) claimed in his study on measuring customer satisfaction and dissatisfaction that in some situations and conditions, customers determine satisfaction and dissatisfaction before purchasing a service. For example, an out of town supermarket increases customer dissatisfaction, consequently enforces to close the local store (Giese & Cote, 2000). Further, Westbrook and Reilly (1983) defined pre-purchase customer satisfaction concept as, “an emotional response to the experiences provided by, or associated with particular products or services purchased, retail outlets, or even molar patterns of behavior such as shopping and buyer behavior, as well as the overall marketplace” (p. 270). Though the literature claiming satisfaction as post-purchase behavior is much more than pre-choice, in retailing,

2.3.1 Customer satisfaction and self-service technologies

The literature explaining the relationship between customer satisfaction and service quality is extensive and elaborates on the dependency of customer satisfaction on service quality (Brady & Robertson, 2001; Akbar & Parvez, 2009; Caruana, 2002). Several empirical studies (Cronin & Taylor, 1992; Parasuraman et al., 1988) illustrates the linkage between satisfaction and perceived service quality. Similarly, a survey of internet retailing by Wolfinbarger and Gilly (2003) elaborates on the link between customer satisfaction and service quality. Another research on e-commerce reveals the significant relationship of electronic service quality and customer satisfaction (Ribbink et al. 2004). Further, several researchers (Fatma & Ali, 2014; Dabholkar, 1996; Iqbal et al., 2018; Kim et al., 2014) have also shown a significant relationship between service quality of self-service technologies and customer satisfaction.

As this research is comparative, thus the impact of service quality of SCOK and JWOT on customer satisfaction will be analyzed. As JWOT is a newer technology, there is no significant previous research available that demonstrates it facilitates in achieving

customer satisfaction. However, some notable researchers attempted to uncover the impact of SCOK on customer satisfaction, specifically in the retail industry. For example, Fatma and Ali (2014) found that SCOK significantly improves customer satisfaction. Similarly, Iqbal et al. (2018) found that service quality of SCOK substantially impacts customer satisfaction, which leads towards gaining customer loyalty as well. Further, Dabholkar and Bagozzi (2012) also found that SCOK improves service quality, which motivates customers for repeat purchases. Customer repeat purchase behavior depicts the satisfaction level.

In a nutshell, the long-term goal of every business activity (even increasing the service quality of the whole process or a single procedure) is to increase satisfaction. Therefore, considering the relationship between service quality and customer satisfaction, researchers believe it is essential to examine the impact of service quality of SCOK and JWOT on customer satisfaction to uncover the best technology for retailers.

2.4 Customer Loyalty

Just like service quality and customer satisfaction, customer loyalty is also one of the most important constructs in marketing and management studies. Very much like service quality and satisfaction, loyalty also has no single definition on which the majority of the scholars have agreed upon in the literature. The majority of researchers defined loyalty based on two attributes; attitude and behavior (Zeithaml, 2000; Setó-Pamies, 2012).

For instance, Dick and Basu (1994) defined it as “the relationship between relative attitude and repeat patronage” (p.103). Similarly, Wong and Sohal (2003) explained it as repeat patronage and a positive attitude toward the product or service. Reichheld (2003) referred customer loyalty as word of mouth, where customer refers to the product or service to others which depict the strength of customer loyalty. Scholars (Mothersbaugh & Hawkins, 2013; Rai & Medha, 2013) stated loyalty as an emotional construct. However, Oliver (1999) defined it as “a deeply held commitment to re-buy or re-patronize a preferred product or service consistently in the future, causing same repetitive brand or same brand-set purchasing, despite situational influences or

marketing efforts” (p. 432). Pearson (1996, pp. 146-152) describes customer loyalty as a cognitive behavior in which customers hold a positive attitude toward a product or service or brand and have intentions of repeat purchasing and recommending it other people.

In a nutshell, customer loyalty is a post-purchase intention of customers that includes referring it to others and have a positive attitude towards repeat purchasing. Further, the profitability of a business lies in customer attitude and behavior (Zeithaml, 2000). Therefore, measurement of customer loyalty construct is valuable for retail companies.

2.4.1 Customer loyalty and self-service technology

Various constructs have been used across the literature for measuring customer loyalty. A study on determining the determinants of customer loyalty in the life insurance sector by Rai and Medha (2013), found that seven determinants form loyalty. These determinants are service quality, trust, customer satisfaction, communication, commitment, switching costs, and corporate image. The study found the service quality as an essential determinant plays a significant role in achieving loyalty, as compared to others. It is also an antecedent of some other determinants, such as customer satisfaction.

Another study attempted to uncover the determinants of customer loyalty in the travel agency sector, Setó-Pamies (2012), found that customer satisfaction and trust of customers are significant determinants. However, service quality is not a significant determinant. Another study conducted by Wilkins (2010) investigated customer loyalty in the hotel industry. Researchers found that service quality is an important mediator, whereas trust and image of the brand are moderators of behavioral loyalty. A recent study (Kandampully, Zhang, & Bilgihan, 2015) also supported these researches and established seven variables that affect loyalty. These variables are brand experience, perceived value, customer satisfaction, the trust of customers, service quality, commitment, and perceived switching cost. Similarly, several researchers (Sainy, 2010; Clottey, Collier, & Stodnick, 2008; Thomas, 2013) have tried to measure the loyalty construct in the retail context. In the retail setting, Sainy (2010) found that service quality positively impacts customer loyalty.

Similarly, several researchers (Fatma & Ali, 2014; Iqbal et al., 2018; Collier & Sherrell, 2010; Meuter et al., 2000) also attempted to measure self-service technologies' impact on customer loyalty. Before the advent of just-walkout technology, the term self-service technology is alternatively used for self-checkout kiosks. For instance, Iqbal et al. (2018) examined SCOK in the retail industry of Pakistan. However, Fatma and Ali (2014) narrowed down the scope of research and focused explicitly on grocery stores of Turkey. Therefore, all the researchers mentioned above elaborated on the impact of SCOK on customer loyalty. However, the contribution of JWOT in achieving loyal customers is still uncertain. There is no significant research that has examined customer behavior in the response of just-walkout technology. Therefore, this research attempts to find the relationships of both SST's, SCOK, and JWOT, with customer loyalty.

Further, according to Thomas (2013), the image of the store directly influences loyalty, whereas customer satisfaction works as a mediator. From the literature available on service marketing, it is evident that loyalty, service quality and satisfaction are prominent factors in influencing customer loyalty. Customer satisfaction either plays a role as a mediator or as a moderator between service quality and loyalty. Besides, the low switching and customers demanding behavior have made retailers think critically about loyalty as well as long term relationships (Gable et al., 2008). According to Martinelli and Balboni (2012), customer loyalty is a crucial factor, and the success of business across the industries lies in it.

2.5 Conceptual framework

A theoretical framework is designed to achieve the desired objectives of this research, which is illustrated below (see figure 1). The figure also shows the relationship between independent and dependent variables. Further, it also demonstrates the hypothesis from H1-H10.

H1: The enjoyment of SCOK and JWOT has a significant impact on (a) customer satisfaction and (b) customer loyalty.

H2: The superior functionality of SCOK and JWOT has a significant impact on (a) customer satisfaction and (b) customer loyalty.

H3: The aesthetic appeal/design of SCOK and JWOT has a significant impact on (a) customer satisfaction and (b) customer loyalty.

H4: The ease of use/convenience of SCOK and JWOT has a significant impact on (a) customer satisfaction and (b) customer loyalty.

H5: The speed of SCOK and JWOT has a significant impact on (a) customer satisfaction and (b) customer loyalty.

H6: The control of SCOK and JWOT has a significant impact on (a) customer satisfaction and (b) customer loyalty.

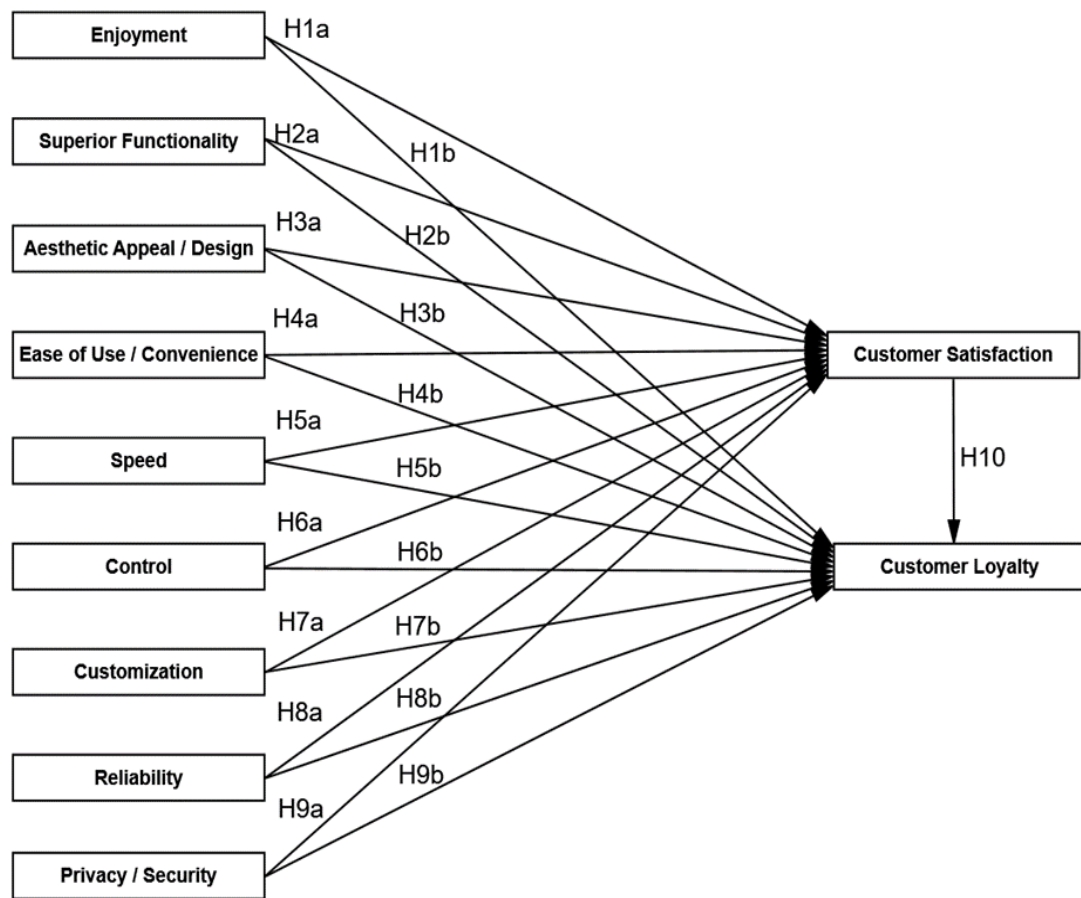
H7: The customization of SCOK and JWOT has a significant impact on (a) customer satisfaction and (b) customer loyalty.

H8: The reliability of SCOK and JWOT has a significant impact on (a) customer satisfaction and (b) customer loyalty.

H9: The privacy/security of SCOK and JWOT has a significant impact on (a) customer satisfaction and (b) customer loyalty.

H10: For SCOK and JWOT, customer satisfaction has significantly associated with customer loyalty.

Figure 1 Theoretical framework



3 METHODOLOGY

This chapter will highlight the design and methodology adopted to achieve the objectives of the research. Similarly, it also encompasses the population and sample size along with the data analysis techniques. Further, it also incorporates the theoretical and logical reasoning behind selecting the research method, population, sample size, and data analysis techniques.

3.1 Research methodology:

The approach used for this research is positivist epistemology, which is based on deductive reasoning and quantitative methods (Wilson, 2014, pp. 33-39). As this research is based on existing theory, deductive reasoning is appropriate because it emphasizes on empirical testing of existing theory. Also, the research questions and objectives rely upon the theoretical framework that needs to be empirically tested because literature lacks in providing significant studies related to the comparison of SST's. Further, this study is handling a substantial volume of data, and research questions are related to percentages and numbers (Wilson, 2014, pp. 36-42). Thus, the most appropriate research approach is adopting a quantitative method.

Also, quantitative methods are the best suitable method for understanding the overall phenomenon for subjects that are not empirically examined before. As there has been no significant study that examined the comparison of service quality of SCOK and JWOT, using quantitative methods are more appropriate than qualitative approaches. Further, the concept of positivism is the base of quantitative research (Wilson, 2014, p. 33), which requires a large volume of data for testing the hypothesis statistically. Further, for a large sample size, the data should be collected in a systematic and controlled way to conduct effective quantitative research. Therefore, the questionnaire is designed with the specified options (see appendix).

Moreover, to determine the validity and reliability of the study, research goals should be clear because the research methodology and measurement tool are dependent on it (Wilson, 2014, pp.133-143). Therefore, in the first chapter, the research questions were explained along with the methodology. The main research question is, "*In retailing,*

which dimensions of service quality effects customers to adopt just-walkout technology over self-checkout technology, by increasing their satisfaction and loyalty?”. It will be answered with the help of three sub-questions, “How just-walkout technology has more impact on customer satisfaction and customer loyalty than self-checkout technology?”, “What is the main difference between the impacts of self-service technologies, JWOT and SCOK?”.

According to Wilson (2014), empirical research that finds the answers to the questions starting with “What”, “Who”, “When” and “How” is descriptive research, which provides accurate results and helps in making decisions. As both sub-questions start with a descriptive word, “How” and “What”. Thus the nature of the research is precise. Further, in the descriptive study, often, the issues related to validity, reliability, and generalizability come up, which can be countered by using a large sample size. Therefore, the survey is the most appropriate method for collecting data as compared to other methods such as interviews. Also, to design a survey, different types of questions can be used, such as open-ended, close-ended, Likert scale, and multiple questions.

In the next part, the methodology for survey distribution, collecting data, and tests required for analyzing data will be discussed.

3.1.1 Research plan

For determining the best suitable method for distribution of survey and collection of data, it should be examined against four criteria, which are cost, response rate, completion time, and biasedness of response (Wilson, 2014, pp. 138-142). In terms of low cost and speedy delivery, the best suitable method for distribution of the survey is online. It helps the researcher to reach out to a large number of potential respondents, even to those who are not living in different geography but obtain the same demographics. Further, for the sake of online distribution, a survey is created on Qualtrics and distributed via email among the population. Still, the response rate and completeness of the survey are uncertain due to which critics suspected the quality of responses gathered online. The last criterion, Wilson emphasized, is biasedness, which can be tackled by the presence of a researcher in the research premises, but in online

distribution, it is not possible. Consequently, to answer biasedness issues, the researcher analyzed the responses critically. The next part discusses the population and sample size.

3.1.2 Population and sample

Before selecting the sample size for data collection, the population should be specified. The population is defined as the “group of research subjects” (Wilson, 2014, p. 221), that a researcher is going to use for sampling. It can be affected by context and questions of research. As this research is focused on the retail grocery market, therefore all the grocery shopper can be specified as population. But, due to a lack of resources and time, it is not possible to reach everyone. However, with the help of the University of Oulu, graduated and currently enrolled students and researchers are approachable. Thus, they are used as the population for this research.

The next step after defining the population is selecting the sample size that represents the population as well as sampling techniques. As this research is comparative, time and resources are limited, and due to the Covid19 pandemic face to face interaction is not possible. Therefore, the best possible sample size for gathering data online is considered as 200 respondents, 100 for each technology. Moreover, for sampling, two techniques are used: Convenience sampling and random sampling. Convenience sampling technique is used for pilot testing, whereas random technique used for the collection of data on a large scale. These techniques are selected as they are beneficial in eliminating biasedness from the data. Furthermore, in random sampling, every potential respondent of the population has an equal opportunity to respond to the survey (Wilson, 2014). In the following part, the data collection process will be discussed.

3.1.3 Designing questionnaire

The survey has three sections: a collection of demographical questions, variable related questions, and complaints related to technology. The first six questions of survey are associated with respondent demographics such as gender, age, education, employment, shopping frequency, and shopping. Multiple choice scale is used for the first section.

Additionally, following the GDPR law, an option of “prefer not to disclose” is added to each demographic question. After demographics, the system must evenly assign the questions of SCOK and JWOT, which is not possible for the platforms like Google form. Therefore, Qualtrics, an online survey platform, is selected, which offers several functions for designing a user-friendly survey. Thus, a function named “Randomizer” is used with an even distribution of technology. It depicts the system automatically assigns the random technology to the population. Then, Once the technology is assigned, a short description, along with a pictorial explanation of the technology appears (see figures 2 and 3). After that, respondents have to answer 36 questions, divided between 10 segments, related to dependent and independent variables. The Likert-type scale is used for all the questions associated with variables, to provide more options for respondents to express their feelings. Later, at the end of the survey, a question with four options related to complaints is asked. Respondents have to choose the top two complaints, which they either faced or anticipate that they might face. Once all the questions are answered, a ‘thank you’ note with the reward video appears on the screen. Both surveys are attached at the end of this research (see Appendix 1 and 2). Further, to ensure the validity of research, the survey is validated with the help of a pilot study.

Figure 2 Self-checkout kiosk



Figure 3 Just-walkout technology



The next step after choosing the sample size, techniques, and designing a survey is the declaration of the data collection method. There are several methods used for collecting data through questionnaires, such as face to face, postal, fax, email (Wilson, 2014, pp. 165-168). The decided method for collection of data is emailed for pilot study and face to face for large scale data collection because it decreases the chances of biasedness. But, due to the Covid19 pandemic situation, physical interaction is shallow even in stores. Therefore, it is difficult to collect data on a large scale through physical interaction. Thus, the survey is distributed online, mainly via email. To ensure randomization and eliminate biasedness, the email encompassing the link of the survey is forwarded to every individual of the population. Then, it is distributed with the help of the University of Oulu. Further, an explanation for conducting the survey is also written in the survey email, and it will improve the ethical aspects of data collection. As a result, the population will be motivated to be part of this novel research.

Further, to ensure the validity of the survey, pilot testing is used. For experts, an option of comment is added in the questionnaire to obtain their opinion related to every

variable. The survey was sent to twelve research experts by email, out of which ten answered the survey. Out of ten, two are the full professors, two are associate professors, and four are assistant professors at Oulu Business School. In contrast, the remaining two are Ph.D. students from the Information Technology department of the University of Oulu. The time frame dedicated to conducting pilot testing is 23.4.2020 – 28.04.2020. The response focused on combining similar questions and replacing the short forms such as JWOT and SCOK, with full form.

Further, they emphasized examining the friendly-ness and length of the survey, as one expert commented it is difficult to answer the questionnaire on smartphones. Therefore, the initially designed study of 53 questions was reduced to 43 items. Similarly, the full form of terms is also used in the survey. Also, 6 out of 10 experts have mentioned overall, the survey is good. The remaining four said it would be useful once the short forms and unnecessary questions are removed. Therefore, the survey is then modified and redesigned in Qualtrics, as suggested by field experts. Later, it is distributed among the students and researchers who have oulu.fi email with the help of the IT department of the University of Oulu. The time frame selected for collecting data is 4.05.2020 – 15.05.2020. Further, as the survey data is collected online, the data can be insufficient for research argued by Wilson (2014), which might affect the empirical analyses of this research.

3.2 Data analysis techniques

Once the data is collected, initially, it will be analyzed by using SPSS. It is a tool used for manipulating and deciphering the data. Further, it emphasizes statistical analysis. Thus, structured questions are incorporated into the survey to obtain statistical data. To find the mean and standard deviation of demographical descriptives and descriptive statistics, SPSS will be employed. Further, it will also be employed to perform an exploratory factor analysis (EFA).

The primary research model used is structural equation modeling (SEM) to find the effects of the independent variable on dependent variables. AMOS, an extension of SPSS, will be used to perform SEM. Still, before SEM and after EFA, confirmatory

factor analysis will be presented to ensure the validity and reliability of variables. In the following part of this research, data analysis techniques will be discussed.

3.2.1 Descriptive statistics

For improving the reliability of data, it is verified against three standards: incomplete answer, unengaged response, and Outliers (Wilson, 2014, pp. 234-242). An incomplete answer refers to the surveys which have some missing fields either in columns or rows. For minimizing this error, respondents are compelled to respond to each question by imposing “force response” on Qualtrics, a platform used for creating an online survey on each item. Unengaged response refers to the response, which has no noticeable variation (Steyn, 2017). It usually occurs when the respondent does not have many options and does not reflect the real point of view. Therefore, in an attempt to diminish this error, a Likert-type scale is utilized, which gives seven choices to respondents seven to express their feelings. Similarly, to eliminate the outliers, ‘a small number of influential observations’ (Kulich, Trojanowski, Ryan, Alexander & Renneboog, 2011), the standard deviation will be measured along with the mean for each question of each technology. Then, once the reliability of data is determined, the respondents’ profile will be discussed with the help of demographic statistics.

3.2.2 Factor analysis

It is a technique used by researchers to validate multiple items with their corresponding constructs. Erik and Marko (2011) referred to “methods for identifying structure within a set of variables” (p. 259). It is used either for grouping or regrouping the items with the help of the interrelationship of factors known as items. Generally, factor analysis determines the correlation of factors (items) and assign the correlated factors to components (variables) (Erik & Marko, pp. 259-262). There are two different types of factor analysis, exploratory factor analyses (EFA), and confirmatory factor analysis (CFA). Exploratory factors are usually used for data reduction and grouping the items based on correlation into most suited variables (generated automatically).

In contrast, confirmatory factor analysis is used to reassure the relationship of items with variables. Further, CFA is used by scholars when they have clear expectations

and predefined items and variable, on the other hand, EFA does not depends upon the predefined relationships, and find all the best possible relationships (Erik & Marko, 2011, pp. 261). Some scholars employing EFA reported that they found new as well some existing relationships (Lin and Hsieh, 2011; Hinkin, 1995). As the variables along with items are adopted from a different context, thus, to confirm the validity of factors, initially, EFA is used, and for further validation of the model, CFA will be applied.

3.2.3 Exploratory factor analysis

SPSS, a statistical software, is employed for exploratory factor analysis. In EFA, mostly two techniques are applied, principal component analysis (PCA) and principal axis factoring (PAF). For this research, PCA is most suitable as it explains the variance among each item. Similarly, Varimax is used as a factor rotation technique because it emphasizes on loading dispersion within the factors. For factor extraction, a parallel analysis technique is used instead of eigenvalue. As in some cases, the use of eigenvalue eliminates several items and shrink the variables as well. Therefore, if the research has variables more than six and item belongs to variables, it is recommended to use parallel analyses (Erik & Marko, 2011, p. 269). They further argued, first, apply eigenvalue greater than 1. After that, if many items are eliminated, along with items having a strong tie with the research and are confirmed as necessary by literature, then apply parallel analysis. As the items, in this research, already belong to constructs. Thus factors are fixed to 11 for extraction. Although it is more beneficial when doing CFA, Erik, and Marko (2011, p. 270) suggested it is also effective with EFA.

Further, from the literature, it is evident that “items did not load as predicted but were retained in the measure, often resulting in low internal consistency reliabilities” (Hinkin, 1995, p. 970). Therefore, it is recommended to adjust coefficient alphas at 0.40 or higher (Hinkin, 1995, p. 971), it facilitates in eliminating the factors with poor loading, which not just increases the reliability but also validates the scale. Similarly, Erik and Marko (2011, p. 264) argued eliminating the multidimensional factors also improves the reliability and validity of the scale. Therefore, this research used coefficient alphas at 0.64.

Further, to identify the goodness of fit, total variance explained (TVE), Kaiser-Meyer-Olkin (KMO) and commonalities can be used (Erik and Marko, 2011, pp. 268-272). The total variance explained determines the variance between the items. KMO defines the adequacy of the correlations. In contrast, the commonalities are somewhat similar to eigenvalue as they explain the total variance of each item. In this research, KMO and TVE will be used for determining the goodness of fit for exploratory factor analysis. In the next phase of data analysis, CFA will be performed for which means of extracted components(variables) will be used for an exogenous latent variable. In contrast, endogenous latent observed variables will be employed.

3.2.4 Confirmatory factor analysis

As Hair, Sarstedt, Hopkins, and Kuppelwieser (2014) argued, CFA provides the statistical basis for either accepting or rejecting the “preconceived theory” (p. 115) by analyzing the fitness of the proposed model. Thus, once EFA is completed, and factors are extracted, CFA is employed to analyze the model. In some respects, CFA is related to EFA, but in terms of philosophy, they are different. In EFA, mostly, numbers of components and number of loading are unknown. Whereas, components are already known as well as their loading items in CFA. Also, according to Hair, Black, Babin, and Anderson (2014, p. 605), the estimated value of standardized loading should be 0.5 or higher, whereas if it is 0.7 or higher, then it is ideal. Therefore, acceptable loading criteria is 0.5 for this research.

CFA is also used for determining the convergent and discriminant validity of the model. Convergent validity states that the measures which are theoretically related, are also related in the model (Hair et al., 2014, p. 601). For adequate convergent validity, each construct of the model should have an average variance extracted value (AVE) 0.5 or higher. On the other hand, discriminant validity ensures that the item is unique and able to calculate what other items cannot in the model (Hair et al., 2014, p. 601). It is obtained by comparing the correlation value with AVE. For instance, if AVE value is higher than the construct correlation value of the construct, then the model possesses discriminant validity. Both types of validity are essential for perfect construct validity.

Correlation is a technique to identify how strongly two variables/items are related to each other. The value of the correlation lies between -1 to 1. A value less than zero, depicts negative correlation, while values higher than zero illustrates positive correlation. However, if the value is zero, it means there is no correlation. For determining the strength of the correlation, the thumb rule is used (Masseran, 2015). Table 4 depicts the correlation coefficient value as per thumb rule. Further, to confirm internal consistency, construct reliability will be determined.

Erik and Marko (2011) referred to reliability as “the degree to which what we measure is free from random error” (p. 388). Reliability is off three types, test-retest reliability, internal consistency reliability, and inter-rater reliability. For quantitative research, internal consistency is mostly used. There are many ways to measure internal consistency reliability; the most common one is the use of Cronbach alpha. It is a technique that measures how strongly items of a similar group relate to each other. It is suggested by UCLA (2020) to limit the Cronbach’s alpha at 0.7 as a minimum. Thus, the variables with a reliability coefficient of less than 0.7 will be rejected.

Table 4 Thumb rule for interpreting correlation (Masseran, 2015)

Size of r	Interpretation
± (0.90 to 1.00)	(Positive or Negative) Very high correlation
± (0.70 to 0.89)	(Positive or Negative) High correlation
± (0.50 to 0.69)	(Positive or Negative) Moderate correlation
± (0.30 to 0.49)	(Positive or Negative) Low correlation
± (0.00 to 0.29)	(Positive or Negative) Little if any correlation

In this research, CFA will be conducted by using composite variables for independent variables, and the unobserved latent variable will be used for dependent variables. Composites variables are formed by merging two or more than two variables and factors (Song, Lin, Ward, & Fine, 2013). They are also known as summated scales (Grapentine, 2000). SPSS will be used for generating composite variables. There are two benefits attached to using composite variables (Grapentine, 2000). First, they help management in determining the most critical and essential variables that impact directly and significantly on a firm’s performance. Second, it facilitates in managing

the impacts of multicollinearity on the estimation of regression coefficients. Therefore, after EFA, the average of each variable is used for producing a composite variable. Further, to examine how well the proposed model and theory fits the data collected (McDonald & Ho, 2002), model fit indices are measured and compared to the accepted level.

Many model fit indices are employed for determining the model fitness, such as Chi-Square statistic, Root Mean Square Error of Approximation (RMSEA), Goodness of Fit (GFI), Adjusted Goodness of Fit (AGFI), Normed-fit Index (NFI), Treatment frequency indices (TFI), Comparative Fit Index CFI and Standardized Root Mean Square Residual (SRMR). Table 5 explains the fitness threshold for each absolute fit. First, these indices are calculated for the whole data (JWOT and SCOK), then later, it will also be calculated separately.

Table 5 Absolute model fit indices

Fit Indices	Criteria	Reference
Chi-Square	< 2	Kline, 1998 and Ullman, 2001
RMSEA	< 0.08	Hu and Bentler, 1999
GFI	≥ 0.95	Miles and Shevlin, 1998
AGFI	≥ 0.95	Tabachnick and Fidell, 2007
CFI	≥ 0.95	Hu and Bentler, 1999
NFI	≥ 0.95	Hu and Bentler, 1999
TFI	≥ 0.95	Schumacker and Lomax, 2004
SRMR	< 0.08	Hu and Bentler, 1999

3.2.5 Structural equation Modeling

For examining the causal relationship between one or more than one dependent and independent variables, two techniques are used, structural equation modeling (SEM) and path analysis. Both are used for testing the theoretical relationships. Practically, SEM is employed for understanding the complicated relationships which cannot be

examined through path analysis. The major difference between the techniques is the measurement of random error. It is a non-systematic error caused due to the inconsistency in respondents' responses (Grapentine, 2000). Comparatively, in structural path analysis, it is assumed that the data is without the random measurement error, which depicts that this method disguise multicollinearity. However, in SEM, random measurement error is a measure for each variable that helps in exposing multicollinearity. In this research, both techniques are used partially. Additionally, the maximum likelihood method is used for predicting the effect relationship in both techniques. Thus, path analysis will be used for independent variables and SEM for dependent variables.

Pictorially, path analysis uses rectangles for representing composite variables in path diagram, whereas in SEM rectangles and ovals/circles are used for demonstrating constructs, and variables and random measurement errors, respectively. The relationship between variables is represented with the help of an arrow. Two types of arrows are used in path diagram, straight single-headed, and curved multi-headed arrows. Straight single-headed arrows represent the impact of one composite construct/variable (determined independently) to another variable (defined with the help of other variables). On the other hand, curved double-headed arrows help in determining the correlation between two variables.

Further, the values written near the straight single-headed arrow are the unstandardized coefficients weights. In contrast, the numbers written above the curved double-headed arrows are correlation coefficients value of two variables. To understand which technology has more impact on customer satisfaction and loyalty, firstly, the significance of the relationship is determined. Then standard regression coefficient weights and t-value will be used to compare the effects of technologies on customer satisfaction and loyalty.

4 EMPIRICAL FINDINGS

4.1 Demographic characteristics

Initially, a total of 285 responses are collected. But due to incompleteness, unengaged responses, and outliers, 60 responses were excluded. So, for empirical analysis, 225 responses are used. Among 225 responses, 117 belongs to self-checkout technology and 108 to just-walkout technology. The following part will discuss the characteristics of respondents.

4.1.1 Gender and age

Out of 227, more than half of the respondents (54.6%) are male, around 41.9% are female, and only 3.5% preferred not to disclose their gender. Then, age is also requested. 5.3% preferred not to share their age. 39.2% are between 18 to 24, and 37.4% are between 25 to 30. A further respondent with age either between 30 to 40 and more than 40 are 15.9% and 2.2%, respectively. The information related to gender and age is summarized in table 5. Moreover, in demographics frequency of education, employment, shopping frequency, and shopping time is asked from respondents to understand the respondent's behavior.

4.1.2 Education

A question regarding the respondent education level is also asked. The respondents with 'elementary' education are 0.4%, whereas 1.3% 'prefer not to disclose'. The respondents preferred education level as 'high school', 'bachelors' and 'masters' are 18.9%, 37.9%, and 37%, respectively. Only 4.4% of respondents have an education level of 'doctoral degree or higher education'. The summary of the respondent's education is presented in table 5.

4.1.3 Employment

Along with the education, information related to employment status is also requested. 26% of participants answered they are 'full time employed', and 11% replied they are

‘employed part-time’. Respondents who selected ‘retired’, ‘unemployed not looking for work’, and ‘unemployed looking for work’ are 0,4%, 0.4%, and 6.2%, respectively. The majority of the sample, 57.2%, answered they are students. Moreover, the summary of responses related to employment is presented in table 5.

Table 6 Demographic characteristics- Frequency and percentage

Characteristics	Frequency	Percentage
Gender		
Male	123	54.6
Female	94	41.9
Prefer not to disclose	8	3.5
Age		
Prefer not to disclose	12	5.3
Between 18 to 24	88	39.2
Between 25 to 30	84	37.4
Between 31 to 40	36	15.9
More than 40	5	2.2
Education		
Elementary School	1	0.4
High School	43	18.9
Bachelors	85	37.9
Masters	83	37.0
Doctoral Degree or Higher Education	10	4.4
Prefer not to disclose	3	1.3
Employment		
Employed full time	58	26.0
Employed part time	25	11.0
Unemployed looking for work	14	6.2
Unemployed not looking for work	1	0.4
Retired	1	0.4
Student	126	55.5

Shopping Frequency		
Daily	6	2.6
4-6 times a week	26	11.5
2-3 times a week	132	59.0
Once a week	50	22.0
Less than once a week	11	4.8
Shopping Time		
Less than 15 minutes	32	14.1
15 - 30 minutes	109	48.5
30 minutes - 1 hour	71	31.7
Between one to two hours	11	4.8
More than two hours	2	0.9

4.1.4 Shopping frequency

To understand the participant's shopping behavior, they are asked with two questions related to how often they go for groceries and how much time they spend on each trip. Referring to question related to the frequency of shopping, 2.6% of respondents answered daily, 11.5% replied 4 to 6 times a week, 59% responded 2 to 3 times a week, 22% replied they go once a week. In contrast, only 4.8% of participants said they do grocery less than once a week. Table 5 provides a summary of the answers.

4.1.5 Shopping time

Like shopping frequency, participants are also requested to share the time they spent on each grocery trip. The participants selected 'less than 15minutes' are 14.1%, '15 to 30 minutes' are 48.5%, and '30 minutes to 1 hour' are 31.7%. A small proportion of respondents, 4.8% and 0.9%, also answered 'between 1 to 2 hours' and 'more than 2 hours', respectively. Table 5 depicts a summary of participants' responses.

4.2 Complaints about self-service technologies

The respondents are also asked a question related to complaints that they anticipate about both technologies. They have the option to select the top two complaints. The results depict that for JWOT, the top two complaint respondents expected are; it is difficult to buy items which need to be weighted (62%), and it gets tedious when more items are purchased (59%). Whereas for SCOK top two complaints are, it gets tedious when more items purchased (59%) and bagging difficulties (57%). Table 7 depicts the results of the findings.

The one complaint among both technologies is similar. Thus, retailers have to explain the solution to the problem graphically or through other ways to customers. It will decrease customer hesitation in using SST's. Consequently, it increases customer motivation in using SST's.

Table 7 Complaints about JWOT and SCOK

Complaints	Technologies	Frequency	Percentage
Lack of other information provided by cashiers (such as promos)	JWOT	48	44%
	SCOK	62	54%
Gets tedious when more items purchased	JWOT	64	59%
	SCOK	72	63%
Difficult to purchase items that need to be weighed	JWOT	67	62%
	SCOK	34	30%
Bagging difficulties	JWOT	37	34%
	SCOK	66	57%

4.3 Factor analysis

As the items of independent variables are taken from a different context, therefore, to confirm the sample adequacy of factory loading, exploratory factor analysis is

employed, whereas for ensuring the validity of model confirmatory factor analysis is used. In the following part, CFA and EFA will be discussed.

4.3.1 Exploratory factor analysis

Initially, this research consists of nine independent variables and two dependent variables, but after exploratory ten variables are extracted, eight independent and two dependent variables. For factor analysis, principal component analysis is used as an extraction technique with orthogonal (varimax) rotation. As the number of variables is known, thus instead of using the eigenvalue number of factors are used. So, we used nine as an input value for independent variables and two for dependent variables. Further, to get only good factor loadings, initially extracted coefficient size value used is 0.4, but some items have high cross-loadings. Therefore, slowly the coefficient size is increased until there is no cross-loading. In a nutshell, the value of the coefficient size used for removing all high cross-loading and poor loadings is 0.64.

For validating the EFA, sampling adequacy is also measured by analyzing the Kaiser-Meyer-Olkin (KMO) value. It helps in determining whether the correlation between extracted variables is suitable for factorial analysis or not. The minimum acceptable cutoff value for KMO is .50 (Kaiser, 1970). The KMO value for the independent and dependent variables is 0.904 and 0.802, respectively, which is more than the minimum threshold. With KMO, Bartlett's test of sphericity of also measured, which is significant as the p-value is less 0.05. Then, the value of the total variance explained (TVE) is determined and compared with the acceptable threshold value, which is 50% (Erik & Marko, 2011, p.272). The result depicts TVE value for independent components is 74.82%, and for dependent components, it is 78.92%, which is more than the acceptable cutoff value.

Further, as the value of TVE and KMO is higher than minimum acceptable values and Bartlett's test of sphericity is significant at 0.001. Therefore, exploratory factor analysis is adequate, and the results are satisfactory. Table 8 depicts the results of the exploratory factor analysis.

From the table, it is evident that several items are dropped. The reason behind dropping is poor loading and high cross-loading. As a result, out of nine independent variables, eight were produced, whereas, for dependent variables, the number remained the same as earlier, two. For dependent variables, items are strongly loaded on respective variables with no cross-loading. Thus, no item/factor is dropped.

Similarly, four independent variables remain unchanged, which are ease of use, speed, control, and customization. Whereas two variables, enjoyment and aesthetic appeal/Design, are merged to form a new variable, entertainment, which has three items. The new dimensions obtain two items of the enjoyment, ENJ2 and ENJ3, and one item of the aesthetic appeal/design, AA1. As the two dimensions are merged, therefore the hypothesis (H1 and H3) proposed in chapter 2 are combined as well to form a single hypothesis. Thus, the new hypothesis states, “as compared to SCOK, the entertainment of JWOT has significantly more impact on (a) customer satisfaction and (b) customer loyalty.”

The remaining items of these two variables are eliminated due to high cross-loadings. From the remaining three independent variables, some items are reduced due to poor loadings (less than 0.4). For instance, one item from reliability, one from privacy, and two from superior functionality are dropped. After EFA, to ensure the validity of model CFA is employed by using AMOS 26.0.

Table 8 Exploratory factor analysis

	1	2	3	4	5	6	7	8	9	10
EU2	0.83									
EU3	0.82									
EU1	0.76									
EU4	0.67									
ENJ1										
SPD2		0.85								
SPD1		0.82								
SPD3		0.76								
SP1										
ENJ2			0.83							

AA1	0.69			
ENJ3	0.67			
SP4				
CST3	0.82			
CST1	0.76			
CST2	0.67			
PRV3				
PRV1	0.81			
PRV2	0.79			
RLB1				
CNT2	0.78			
CNT1	0.73			
CNT3	0.69			
RLB2	0.86			
RLB3	0.78			
SP3	0.82			
SP2	0.66			
AA3				
AA2				
SAT1	0.65			
SAT2	0.93			
SAT3	0.92			
LYT3				0.94
LYT2				0.93
LYT4				0.89
LYT1				0.79

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

1 Ease of Use (EU) , 2 Speed (SPD), 3 Entertainment, 4 Customization (CST), 5 Privacy (PRV), 6 Control (CNT), 7 Reliability (RLB), 8 Superior Functionality (SP), 9 Customer Satisfaction (SAT), 10 Customer Loyalty (LYT)

4.3.2 Confirmatory factor analysis

CFA is employed for measuring the psychometric properties of the scales. As stated earlier, composite scales are used for exogenous variables, whereas for endogenous

variables, observed latent variables are employed (Figure 4). Before validity analysis, the data of the model is analyzed against the fit indices. Thus, to achieve model fitness and remove fit discrepancies, initially, two items were removed, SAT1, and LYT1 due to lower factor loading, still the fit indices are not adequate and acceptable. Thus, modification indices are used to check covariance between items. The only covariance that is larger than 10 is between e5 and e6, which is drawn by using a double-headed arrow. Then adequate fit is achieved because the Chi-square is not large, having a value of 37.23 with $p < .001$, and Cmin / Df is 1.405, which is less than 2. Similarly, other fit indices are also acceptable such as NFI = 0.980, TLI = 0.983 CFI = 0.994 GFI = 0.976 AGFI = 0.918, RMSEA = 0.043 and SRMR = 0.015. Thus, the hypothesized model for this study is acceptable. Following the adequate overall fit, reliability, convergent validity, and discriminant validity are assessed.

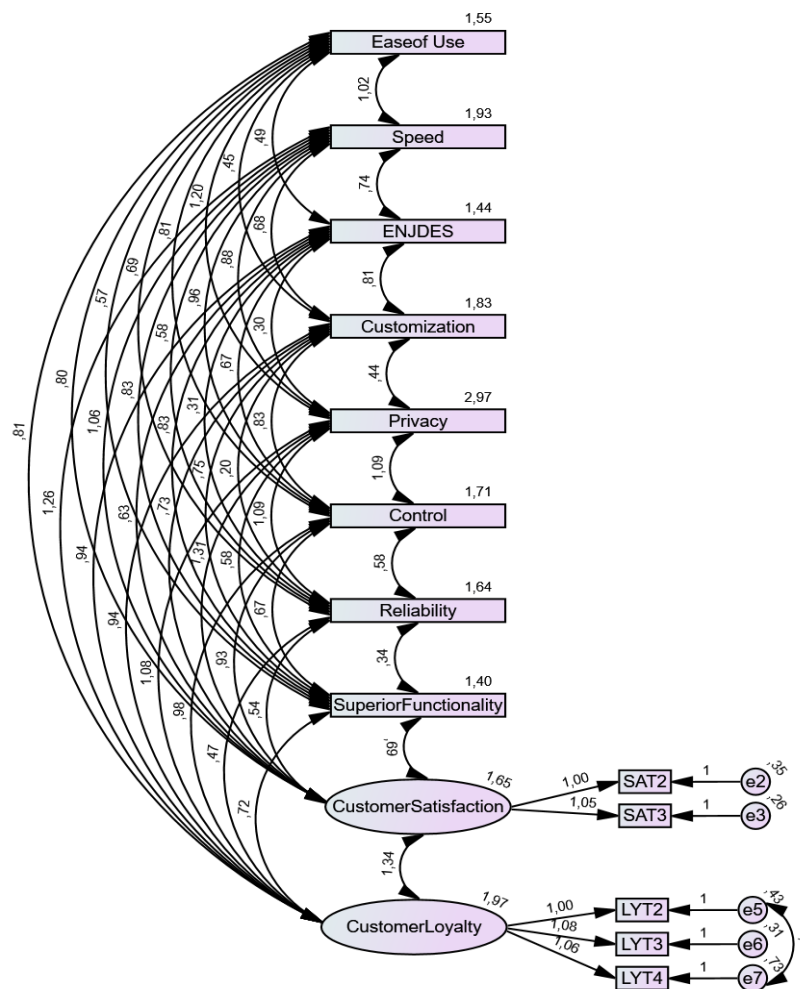
For measuring reliability, each variable is analyzed individually. The acceptable threshold value for each variable is 0.7. Table 8 depicts the reliability and validity analysis of CFA, which confirms each variable possesses satisfactory composite reliability (CR) as the value is higher than the minimum acceptable value, 0.7 (Bagozzi and Yi 1988; 2012). For instance, customer satisfaction Cronbach alpha value of 0.918, and customer loyalty has 0.931. It depicts the model is reliable.

Then, to ensure the convergent validity, the value of the average variance extracted is examined and compared to its acceptable threshold, 0.5 (Bagozzi and Yi 1988; 2012). Table 8 depicts the model hold the convergent validity in addition to reliability, as AVE value of customer satisfaction is 0.848, and customer loyalty is 0.818. Following the convergent validity and reliability, discriminant validity is also measured by using the method proposed by Fornell and Larcker (1981) that comparison of the value of AVE and respective correlation. If the AVE is higher than the correlation, then the model possesses discriminant validity. Table 9 depicts the correlation between customer satisfaction and customer loyalty is significant and robust, with a value of 0.7444. But its value is less than AVE. Thus, the model possesses discriminant validity as well. Furthermore, the tests mentioned above depicts each variable possesses unidimensionality, convergent, and discriminant validity.

Table 9 Validity analysis

	CR	AVE	MSV	CusSat	CusLoy
CusSat	0.918	0.848	0.553	0.921	
CusLoy	0.931	0.818	0.553	0.744*	0.904

CR = Composite reliability, AVE = average variance extracted, MSV = maximum shared variance, * = $p < 0.001$, CusSat= Customer satisfaction & CusLoy= Customer Loyalty

Figure 4 Confirmatory factor analysis (n = 225)

4.4 Descriptive statistics

After the factor analysis, the mean and standard deviation is measured for all items and variables. First, it is calculated for SST (JOWT and SCOK together). Then, they are computed for JWOT and SCOK separately, after separating the combined data into relevant technologies. The summary of descriptive statistics is presented in table 10.

As the likert-type scale is used in the survey, which means the variables with a mean-value less than four depict, the respondent disagrees with the statements. In contrast, the variables with a mean-value more than four illustrates respondents' agreement about the statement. A mean of four shows respondents are neutral about the statement.

Table 8 depicts that SCOK has five items (Enj2, Enj3, CST1, CST2, & CST3), which has a mean value of less than four. Out of 5 items, CST3 is the only item that has a mean value of less than 3 (disagree). All other items have values between three and four, which means respondents somewhat disagree. As compared to SCOK, JWOT has four items (CNT1, CST2, PRV1, & PRV2) whose mean value is between 3 and 4. Similarly, the variable means are also analyzed and found there is only one variable 'privacy', which has a mean value less than four for JWOT, but in SCOK 'customization and entertainment' has a mean value less than 4. These mean values depict that respondents think SCOK lack in providing customization, enjoyment, and aesthetic appeal/ design, whereas, JWOT lacks privacy only.

Further, the variables with a mean value between four and five shows respondents 'somewhat agree' whereas values greater than 5 depicts respondents completely 'agree' with the statements of a variable. Out of 8 JWOT, four independent variables (entertainment, customization, control, & reliability) have a mean value between four and five, and three (superior functionality, speed, & ease of use) have means values higher than five. As compared to JWOT, SCOK has only one (control) out of 8 independent variables that have a mean value between four and five, whereas four variables (speed, ease of use, privacy, reliability, & superior functionality) have a mean value higher than five. Further, for JWOT mean value of both dependent variables is between four and five, whereas for SCOK satisfaction is more than five, and customer loyalty has a value between four and five.

By using the mean value of each variable, SCOK and JWOT are compared. For JWOT ease of use/convenience, speed, entertainment, customization, superior functionality, and customer loyalty has a mean value of 5.54, 5.46, 4.54, 4.10, 5.35 and 4.76, respectively, whereas for SCOK it is 5.01, 5.36, 3.96, 3.40, 5.10 and 4.42. It depicts that respondents believe JWOT provides more ease of use/convenience, speed, entertainment, customization, superior functionality, and customer loyalty than

SCOK. In contrast, SCOK has a higher mean value than JWOT for privacy, control, reliability, and customer satisfaction (see table 10). It indicates customers think self-checkout kiosk offers more privacy, control, reliability, and customer satisfaction than just-walkout technology.

Table 10 Descriptive statistics for SST, JWOT, and SCOK

Items	SST (n= 225)	JWOT (n= 108)	SCOK (n= 117)
	Mean (SD)	Mean (SD)	Mean (SD)
AA1	4.52 (1.32)	4.68 (1.21)	4.38 (1.40)
ENJ2	4.05 (1.55)	4.25 (1.51)	3.86 (1.50)
ENJ3	4.14 (1.54)	4.69 (1.50)	3.64 (1.41)
SP2	5.11 (1.52)	4.69 (1.64)	5.49 (1.29)
SP3	5.35 (1.37)	5.37 (1.27)	5.33 (1.46)
EU1	5.10 (1.49)	4.88 (1.50)	5.31 (1.46)
EU2	5.41 (1.44)	5.13 (1.54)	5.67 (1.30)
EU3	5.38 (1.41)	5.04 (1.52)	5.70 (1.23)
EU4	5.10 (1.43)	4.68 (1.55)	5.50 (1.18)
SPD1	5.41 (1.55)	5.31 (1.62)	5.50 (1.47)
SPD2	5.58 (1.45)	5.58 (1.51)	5.58 (1.40)
SPD3	5.24 (1.47)	5.18 (1.55)	5.31 (1.39)
CNT1	4.37 (1.58)	3.93 (1.65)	4.79 (1.40)
CNT2	4.50 (1.61)	4.21 (1.75)	4.77 (1.44)
CNT3	4.77 (1.33)	4.60 (1.35)	4.93 (1.30)
CST1	3.78 (1.58)	4.06 (1.62)	3.53 (1.50)
CST2	3.79 (1.61)	3.89 (1.75)	3.70 (1.46)
CST3	3.64 (1.64)	4.36 (1.45)	2.97 (1.52)
RLB2	4.92 (1.55)	4.44 (1.65)	5.38 (1.30)
RLB3	5.09 (1.28)	4.69 (1.31)	5.45 (1.13)
PRV1	4.53 (1.85)	3.49 (1.21)	5.49 (1.28)
PRV2	4.77 (1.76)	3.94 (1.84)	5.54 (1.27)
SAT2	4.71 (1.42)	4.30 (1.45)	5.09 (1.28)

SAT3	4.71 (1.45)	4.33 (1.50)	5.06 (1.31)
LYT2	4.50 (1.55)	4.51 (1.60)	4.50 (1.51)
LYT3	4.58 (1.62)	4.44 (1.68)	4.71 (1.57)
LYT4	4.01 (1.71)	4.01 (1.81)	4.05 (1.62)
Variables			
Ease of Use	5.35 (1.25)	5.54 (1.31)	5.01 (1.12)
Speed	5.41 (1.39)	5.46 (1.43)	5.36 (1.36)
entertainment	4.24 (1.20)	4.54 (1.21)	3.96 (1.14)
Customization	3.74 (1.36)	4.10 (1.35)	3.40 (1.28)
Privacy	4.65 (1.73)	3.72 (1.73)	5.51 (1.21)
Control	4.55 (1.31)	4.25 (1.34)	4.83 (1.23)
Reliability	5.01 (1.28)	4.56 (1.34)	5.41 (1.09)
Superior Functionality	5.22 (1.19)	5.35 (1.15)	5.10 (1.21)
Satisfaction	4.92 (1.14)	4.54 (1.15)	5.28 (1.02)
Loyalty	4.60 (1.40)	4.76 (1.55)	4.42 (1.23)

Conclusively, the means presented in table 10 depict that the responses are a mix of items and variables. As the figures lie on both sides of the scale, such as disagreement and agreement, It ensures the data distribution is normal. The standard deviation also confirms the normal distribution of data, as it is lower than the mean value. Consequently, it depicts the data points tend to be very close to the mean, and data around the mean is concentrated in results.

4.5 Structural path analysis

For testing the hypothesis, structural path analysis is used. Before comparative analysis, the hypothesized model is tested by using all data. The result depicted there are some insignificant and significant paths. In pursuit of finding all significant paths, the insignificant paths are deleted gradually. Figure 5 and figure 6 represent the path diagram for the hypothesized and cleaned model for $n = 225$, respectively. After obtaining significant paths, model fitness is assessed, which confirmed the fit adequacy of the cleaned model. Table 11 represents the adequate fit indices evaluated

for both hypothesized (see figure 5) and cleaned (see figure 6) model, which depicts there is no inadequate fluctuation in any value of fit indices.

Figure 5 Hypothesized model for (n=225)

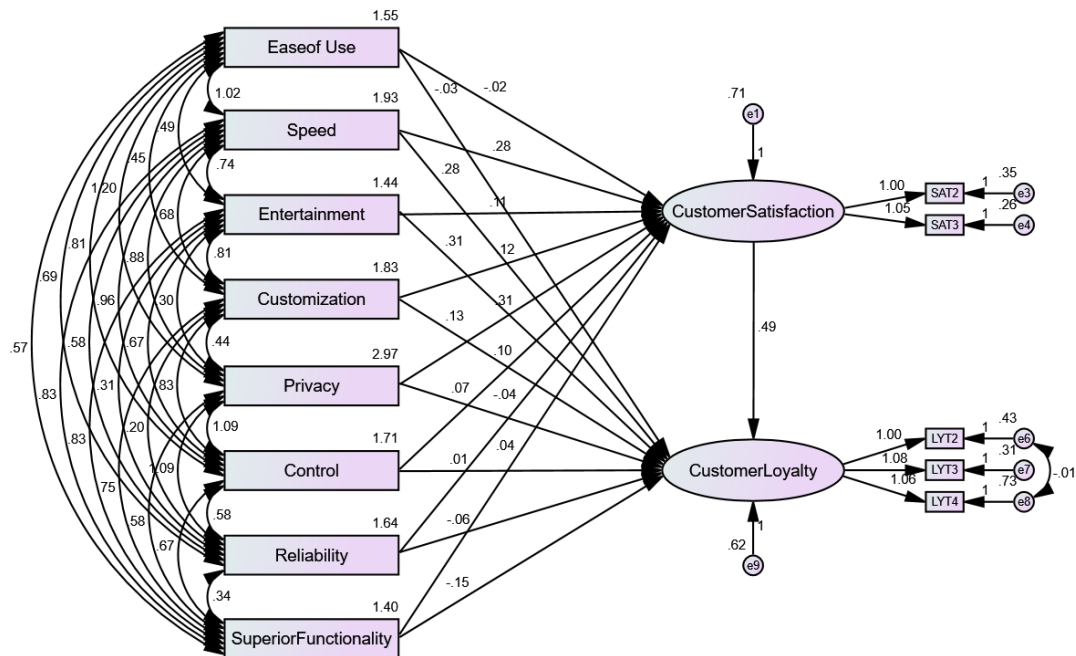


Table 11 Comparison of fit indices (n=225)

	Chi-square	DF	CMIN/DF	NFI	TLI	CFI	GFI	AGFI	RMSEA	SRMR
Hypothesized	37.932	27	1.405	0.980	0.983	0.994	0.976	0.918	0.043	0.015
Cleaned	32.830	21	1.563	0.979	0.983	0.992	0.973	0.930	0.050	0.019

For analyzing the hypothesized model, structural equation modeling, along with structural path analysis, is employed through AMOS 26. Table 12 represents the finding of the research for self-service technologies. It also depicts all the significant dimensions for SST's service quality along with the t-value. For determining the effect size of each dimension, t-statistic is used. From table 12, it is evident that out of 8 dimensions, five dimensions have a significant impact on customer satisfaction, whereas to customer loyalty, only three dimensions are significantly impacting.

Among the five significant dimensions impacting customer satisfaction, four dimensions have a positive impact, and one dimension has negative. The dimensions

with positive impact are speed, entertainment, customization, and privacy with a t-value of 5.451, 2.152, 2.874, and 8.058, respectively. However, superior functionality is the only dimension that negatively impacts customer satisfaction. In contrast, speed entertainment and customization are the only three dimensions of SST's, which are impacting on customer loyalty. All three have a positive impact, such as speed has a t-value of 4.55, entertainment has a t-value of 4.342, and customization has a t-value of 2.374. Also, the relationship between the dependent variables is analyzed, depicting a significant impact of customer satisfaction on customer loyalty.

Table 12 Hypothesized paths and cleaned model with standard estimates and t-value (n=225)

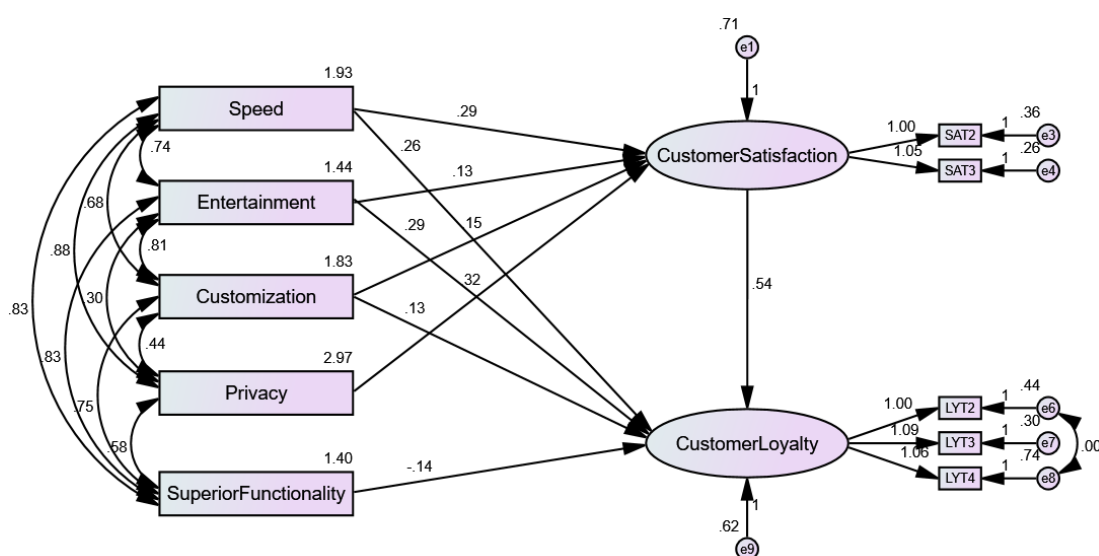
Hypothetical Model	Cleaned Model	
Path	St Est (sig)	T-Value
Customer Satisfaction <--- Ease of Use	(NS)	(NS)
Customer Satisfaction <--- Speed	0,294***	5,451
Customer Satisfaction <--- Entertainment	0,135*	2,152
Customer Satisfaction <--- Customization	0,154*	2,874
Customer Satisfaction <--- Privacy	0,320***	8,058
Customer Satisfaction <--- Control	(NS)	(NS)
Customer Satisfaction <--- Reliability	(NS)	(NS)
Customer Satisfaction <--- Superior Functionality	-0,143*	-2,131
Customer Loyalty <--- Ease of Use	(NS)	(NS)
Customer Loyalty <--- Speed	0,265***	4,550
Customer Loyalty <--- Entertainment	0,286***	4,342
Customer Loyalty <--- Customization	0,128*	2,374
Customer Loyalty <--- Privacy	(NS)	(NS)
Customer Loyalty <--- Control	(NS)	(NS)
Customer Loyalty <--- Reliability	(NS)	(NS)
Customer Loyalty <--- Superior Functionality	(NS)	(NS)
Customer Loyalty <--- Customer Satisfaction	0,539***	7,865

* p<0.05, ** p<0.01, *** p<0.001 & NS = Insignificant Paths

It depicts that for achieving customer satisfaction, privacy and speed are two most important dimensions. However, for approaching customer loyalty (repeat purchase),

speed and entertainment (enjoyment and design/aesthetical appeal) are the most critical dimensions for self-service technologies. Table 12 depicts all the dimensions that are significant for measuring the service quality of self-service technologies. There is also a possibility of missing some dimensions which are significant for any particular SST. Hence, instead of assuming, this research measured the hypothesized model separately for each technology and obtained all the significant dimensions.

Figure 6 Cleaned model (n = 225)



4.5.1 Just-walkout technology

The responses collected for JWOT are 108 out of 225. Based on them, the hypothesized model is assessed, which represented an adequate model fit as all the fit indices are above/below the acceptable threshold stated in the previous chapter (see table 13). Then, the hypothesized model is tested using JWOT data. Results depict some paths are significant, and few are insignificant. Thus, to acquire a model with all significant paths, insignificant paths are removed one by one, starting from the path having the largest insignificant value. Once the cleaned model (a model having all significant paths) is acquired (see figure 8), it is then again examined against the fit indices for ensuring its acceptability. Upon comparing the model fit indices of both models, no big variation is observed (see table 13). As all the fit indices are adequate and acceptable, thus the cleaned model is also acceptable.

Table 13 Comparison of fit indices (n=108)

	Chi-square	DF	CMIN/DF	NFI	TLI	CFI	GFI	AGFI	RMSEA	SRMR
Hypothesized	38.16	27	1.413	0.968	0.971	0.990	0.949	0.827	0.060	0.019
Cleaned	26.98	17	1.587	0.968	0.974	0.988	0.949	0.864	0.074	0.028

Following the fit indices, the results of structural equation modeling are also compared (see table 14). From the hypothesized model of JWOT, only four dimensions turned out significant. The dimensions are speed, entertainment, privacy, and control. Entertainment and Privacy are the two dimensions that have a significant impact on both dependent variables, whereas speed just impacts on customer loyalty and control impacts on customer satisfaction. For measuring the impact size, the t-value is employed. Table 14 depicts the t-value, along with the significance of the effect. The most critical dimension of JWOT for customer satisfaction, as it has the largest t-value of 4.172. The impact of Enjoyment and speed is 2.525 and 3.439, respectively.

Table 14 Hypothesized paths and cleaned model with standard estimates and t-value (n=108)

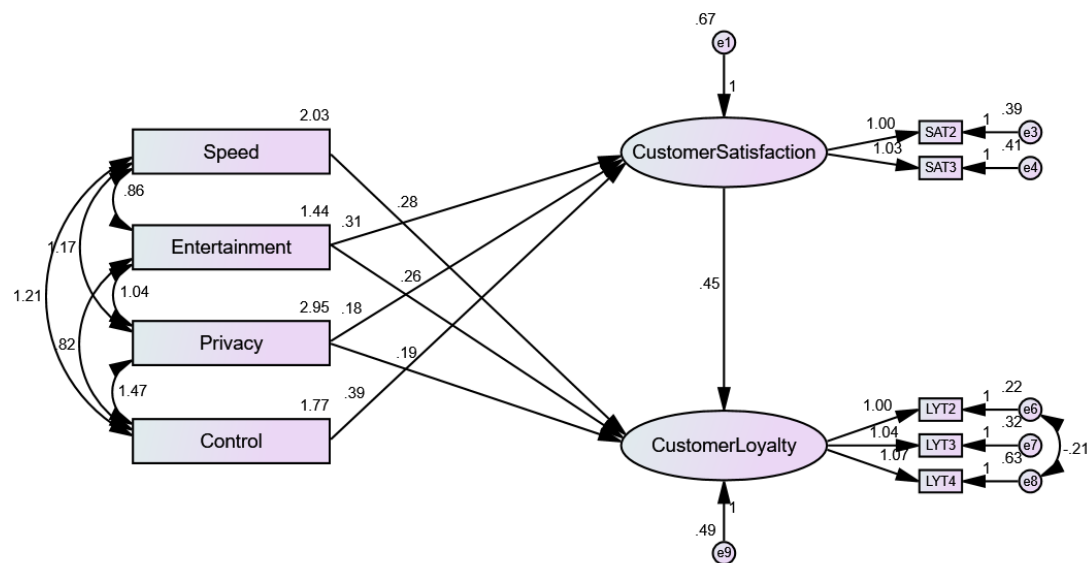
Hypothetical Model	Cleaned Model	
Paths	St Est (sig)	T-Value
Customer Satisfaction <--- Ease of Use	(NS)	(NS)
Customer Satisfaction <--- Speed	(NS)	(NS)
Customer Satisfaction <--- Enjoyment	0,314***	3,439
Customer Satisfaction <--- Customization	(NS)	(NS)
Customer Satisfaction <--- Privacy	0,179*	2,525
Customer Satisfaction <--- Control	0,387***	4,172
Customer Satisfaction <--- Reliability	(NS)	(NS)
Customer Satisfaction <--- Superior Functionality	(NS)	(NS)
Customer Loyalty <--- Ease of Use	(NS)	(NS)
Customer Loyalty <--- Speed	0,28***	4,363
Customer Loyalty <--- Enjoyment	0,263*	3,134
Customer Loyalty <--- Customization	0,194***	3,247
Customer Loyalty <--- Privacy	(NS)	(NS)
Customer Loyalty <--- Control	(NS)	(NS)
Customer Loyalty <--- Reliability	(NS)	(NS)

Customer Loyalty <--- Superior Functionality	(NS)	(NS)
Customer Loyalty <--- Customer Satisfaction	0,453***	4,661

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ & NS = Insignificant Paths

On the other hand, among the three dimensions that are impacting customer loyalty, speed is an important one because it has the highest t-value, 4.363. The t-value for entertainment is 3.134, and for customization is 3.247, which shows they have almost similar impact size. Following the impact sizes of the independent variable on the dependent variable, the direct impact of customer satisfaction on customer loyalty is also measured, which is significant as well. Further, this impact is even larger than the effect of independent variables on the dependent variable as it has a larger t-value, 4.661 (see table 14).

Figure 7 Cleaned model for JWOT (n = 108)



In a nutshell, for customer satisfaction, three dimensions of JWOT are essential, which are entertainment (enjoyment and design/aesthetic appeal), privacy, and control. On the other hand, for gaining customer loyalty speed, entertainment, and the privacy of JWOT are critical.

4.5.2 Self-checkout technology

For SCOK, 117 responses are collected. Initially, the hypothesized model is drawn, and its fit indices are measured, which are then compared to the threshold level and found acceptable. Then, all the paths of the model are critically analyzed to obtain the cleaned model by removing insignificant paths one by one. After obtaining all significant paths, the model fit indices are measure again and compared with the fit indices of the hypothesized model. All fit indices for both models are adequate and acceptable (see table 15). Figure 9 represents the cleaned model for SCOK. Further, values written above the single-headed arrows originating from exogenous variables towards endogenous are unstandardized path coefficient weights.

Table 15 Comparison of fit indices (n=117)

	Chi-square	DF	CMIN/DF	NFI	TLI	CFI	GFI	AGFI	RMSEA	SRMR
Hypothesized	42.92	27	1.566	0.952	0.945	0.981	0.951	0.836	0.070	0.021
Cleaned	39.01	21	1.858	0.946	0.943	0.973	0.942	0.848	0.079	0.033

Table 16 depicts all significant and insignificant paths for self-checkout technology. Based on these paths, a new model is drawn and labeled as clean because it has all significant paths. The difference between the hypothesized model and the cleaned model is evident. As in the hypothesized model, this study initially proposed nine dimensions, but later eight dimensions are produced after EFA by merging enjoyment and aesthetic appeal/design, which have an impact on customer satisfaction and customer loyalty. However, in the cleaned model, only five dimensions are significant for self-checkout kiosks. Those dimensions are speed, entertainment, customization, privacy, and superior functionality.

Table 16 Hypothesized paths and cleaned model with standard estimates and t-value (n=117)

Hypothetical Model	Cleaned Model	
Paths	St Est (sig)	T-Value
Customer Satisfaction <--- Ease of Use	(NS)	(NS)
Customer Satisfaction <--- Speed	0,38***	5,819

Customer Satisfaction <--- Enjoyment	(NS)	(NS)
Customer Satisfaction <--- Customization	0,168*	2,691
Customer Satisfaction <--- Privacy	0,185*	2,829
Customer Satisfaction <--- Control	(NS)	(NS)
Customer Satisfaction <--- Reliability	(NS)	(NS)
Customer Satisfaction <--- Superior Functionality	-0,16*	-2,302
Customer Loyalty <--- Ease of Use	(NS)	(NS)
Customer Loyalty <--- Speed	0,188*	2,166
Customer Loyalty <--- Enjoyment	0,259*	2,852
Customer Loyalty <--- Customization	(NS)	(NS)
Customer Loyalty <--- Privacy	(NS)	(NS)
Customer Loyalty <--- Control	(NS)	(NS)
Customer Loyalty <--- Reliability	(NS)	(NS)
Customer Loyalty <--- Superior Functionality	-0,199*	-2,296
Customer Loyalty <--- Customer Satisfaction	0,68*	5,707

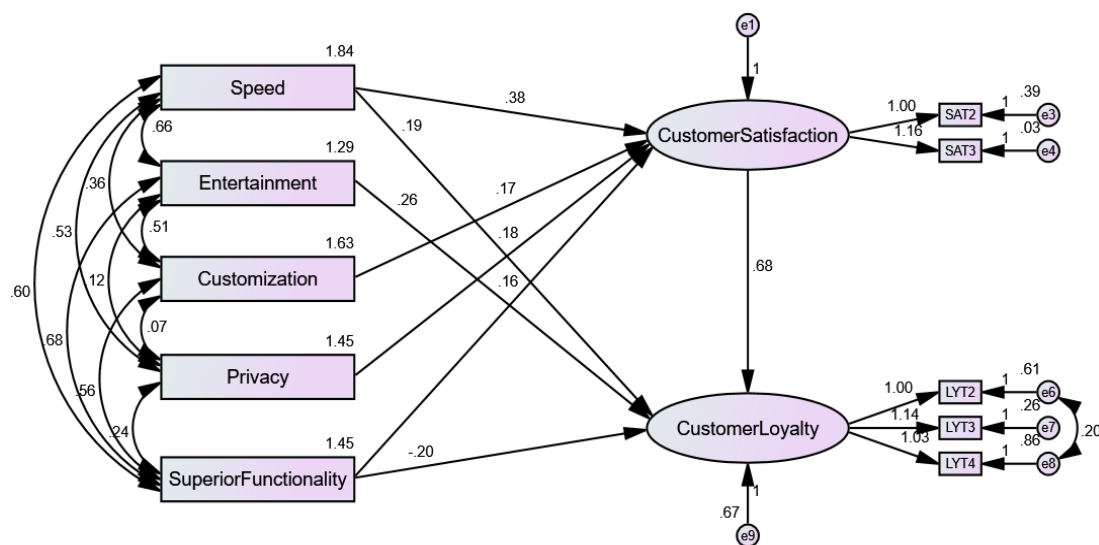
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ & NS = Insignificant Paths

Out of 5 significant dimensions, speed and superior functionality are the only two dimensions that have an impact on customer satisfaction and customer loyalty as well. Whereas, among the remaining three dimensions of SCOK, customization and privacy facilitate in achieving customer satisfaction, and entertainment assists in attaining customer loyalty.

Similarly, the impacts are also measured by using the t-statistics (see table 16). It shows, positively, speed of SCOK impacts the most on achieving customer satisfaction as its t-value is biggest, 5.819. Following the speed, customization and privacy are also positively significant but has almost equal because there is not much difference in their t-value. For instance, customization has a t-value of 2.691, and privacy has a t-value of 2.829. On the other hand, the impact of superior functionality is negatively significant, with a t-value of -2.302. It indicated customer becomes dissatisfied if they find self-checkout kiosk has technically advance features that are hard to understand.

Further, speed, entertainment, and superior functionality have a significant effect on customer loyalty with t-values of 2.166, 2.852, and -2.296, respectively. It indicates positively, entertainment has the largest impact, whereas, negatively, only superior functionality influences customer satisfaction. In the end, customer satisfaction's association with customer loyalty is also examined, which results as positively significant with a t-value of 5.707.

Figure 8 Cleaned model for SCOK (n= 117)



4.6 Summary of results

In this chapter, the researcher will analyze the hypothesis in light of the findings. Table 17 illustrates the results of the hypotheses in terms of acceptance and rejection.

Table 17 Results of hypotheses

Hypotheses		Results	
		A	B
H1	The entertainment of SCOK and JWOT has a significant impact on (a) customer satisfaction and (b) customer loyalty.	Accepted	Accepted
H2	The superior functionality of SCOK and JWOT has a significant impact on (a) customer satisfaction and (b) customer loyalty.	Rejected	Rejected

H4	The ease of use/convenience of SCOK and JWOT has a significant impact on (a) customer satisfaction and (b) customer loyalty.	Rejected	Rejected
H5	The speed of SCOK and JWOT has a significant impact on (a) customer satisfaction and (b) customer loyalty.	Rejected	Accepted
H6	The CONTROL of SCOK and JWOT has a significant impact on (a) customer satisfaction and (b) customer loyalty.	Accepted	Rejected
H7	The customization of SCOK and JWOT has a significant impact on (a) customer satisfaction and (b) customer loyalty.	Rejected	Accepted
H8	The reliability of SCOK and JWOT has a significant impact on (a) customer satisfaction and (b) customer loyalty.	Rejected	Rejected
H9	The privacy/security of SCOK and JWOT has a significant impact on (a) customer satisfaction and (b) customer loyalty.	Rejected	Rejected
H10	For SCOK and JWOT, customer satisfaction has significantly associated with customer loyalty.	Rejected	

For testing the hypotheses, significance and impact size is considered. Therefore, in the light of the cleaned model and t-table of just-walkout technology and self-checkout kiosk, hypotheses are answered. But before a thorough examination of each hypothesis, it should be noted that after exploratory factor analysis, two dimensions are merged, and forming a new dimension, entertainment, as their items are highly correlated. The two dimensions were Enjoyment and Aesthetic Appeal / Design. Thus, the hypothesis H1 and H3 are merged and form a new hypothesis using the newly formed dimensions, that states, “As compared to SCOK, the entertainment of JWOT has significantly more impact on (a) customer satisfaction and (b) customer loyalty.” Further, our results from SEM indicates H1a, H1b, H5b, and H7b are the only hypothesis that is accepted. In the following discussion, each hypothesis will be discussed individually.

In the first hypothesis, the results of the impact of entertainment on customer satisfaction and customer loyalty of JWOT and SCOK are compared. This dimension is meaningful for both technologies as it is significant for both. Thus, to determine which technology entertainment has more impact on customer satisfaction and customer loyalty, the t-value is used. Significantly, JWOT has higher t-values than

SCOK, which indicates H1a and H1b are accepted. A similar procedure is applied to measure all other hypotheses and found the results that are represented in table 17.

As the technologies are examined separately, thus it is noted that some dimensions are not crucial for JWOT, but for SCOK, they are essential and vice versa. The significant dimensions for achieving customer satisfaction through SCOK are speed, customization, privacy, and superior functionality. In contrast, dimension impacts on customer satisfaction of JWOT are entertainment, privacy, and control. Similarly, the significant dimensions of service quality of JWOT impacting on the loyalty of customers are speed, entertainment, and customization, whereas for SCOK speed, entertainment, and superior functionality are the one's impacts significantly on customer loyalty. All the impacts of significant dimensions of JWOT on customer satisfaction and loyalty are positive. However, in SCOK, all significant dimensions other than superior functional have positive impacts on customer satisfaction and loyalty.

4.7 Answer to the sub-questions

This section, with the aid of existing literature and empirical analysis, attempts to answer the main research question. In pursuit of finding an answer to our main question, we divided it into three sub-questions. Objectives were made, and hypotheses are posited for obtaining answers to sub-questions. Thus, starting from answers of the first sub-question.

“What are the dimensions of Just-walkout technology and self-checkout kiosk that significantly impacts on customer satisfaction and customer loyalty?”.

From the literature (Lin & Hsieh, 2011; Balaji & Roy, 2017; Dabholkar, 1996), initially, nine dimensions were acquired. Out of those nine dimensions, only four dimensions turned out significant for JWOT and five dimensions for JWOT. Several qualitative studies emphasized on the significance of speed in self-service technologies (Howard & Worboys, 2003). However, two prominent studies by Dabholkar (1996) and Dabholkar and Eun-Ju (2003) also found speed is not significant for SST's. Therefore, they concluded speed does not matter for SST's. In contrast, this study

empirically argues speed is a positively significant dimension of both technologies. It directly influences customer satisfaction and loyalty for SCOK, but in JWOT, it just affects customer loyalty.

Similarly, entertainment is also positively significant for both technologies. in JWOT, it affects the satisfaction and loyalty of customers, while in SCOK, it only impacts on customer loyalty. This finding of our study is in line with the results of studies performed by Lin and Hsieh (2011), Kim et al. (2014), Fatma and Ali (2014), and Iqbal et al. (2018). Further,

Then, security/privacy is determined that is also significant for both technologies but has inverse results than entertainment. For SCOK, security/privacy has a significant impact on customer satisfaction and supports the study of Inmana and Nikolova (2017). In contrast, this dimension of SCOK has no significant impact on customer loyalty. This result opposes the findings of Eastlick et al. (2006) as they argue security/privacy of SCOK has a direct effect on customer loyalty. On the other hand, the finding of JWOT entirely supports the studies of Inmana and Nikolova (2017) and Eastlick et al. (2006) because it has a direct positive impact on customer satisfaction and loyalty.

Customization, a dimension with contradictory results in the literature (Fatma & Ali, 2014; Radomir & Nistor 2012; 2014; Iqbal et al. 2018; Mathwick et al., 2010), also resulted differently for both technologies. For JWOT, it is insignificant and has no direct impacts opposing the results of the scholars mentioned above. But for SCOK, it is positively significant, impacting directly on just customer satisfaction, partially supporting the studies of scholars, as for customer loyalty, customization of SCOK is insignificant.

Further, empirical analysis depicts control also has mixed results. It is positively significant for JWOT but has an impact only on customer satisfaction, whereas for SCOK, it is entirely insignificant. Therefore, for JWOT, the results are in line with the finding of Dabholkar (1996), Dabholkar, and Eun-Ju (2003) and Collier and Sherrell (2010), as they also find control impacts on customer satisfaction. But in the context of control of JWOT impacting on customer loyalty, the findings contradict the

literature. However, for SCOK, results for control are entirely opposing the researchers, as mentioned earlier.

Reliability is the only dimension that is insignificant for both technologies. Even though, the prior research (Fatma and Ali, 2014; Zeithaml et al., 2002; Dabholkar & Eun-Ju, 2003) emphasize on the significance of reliability and its direct impact on customer satisfaction and customer loyalty. But it is found insignificant and opposes their findings. On the other hand, it could be possible due to the small sample size and to the specific population, young people, it is not essential.

In the end, the most exciting results of this study are related to superior functionality, which is significant only for SCOK. But have negative direct impacts on customer satisfaction and loyalty. It depicts, customers do not prefer technology that has more features as it also increases the complexity and complication. Further, the continuous enhancement in interface, functions, and features of self-checkout kiosk would uproot the customer dissatisfaction and adversely impacts on customer loyalty.

Further, to answer the second sub-question, the researcher has compared the impacts of dimensions of both technologies using t-values. The second sub-question is,

“How just-walkout technology has more impact on customer satisfaction and customer loyalty than self-checkout technology?”.

This sub-question will be answered with the aid of hypotheses, which indicates JWOT has three dimensions (entertainment, privacy/security & control) that influence customer satisfaction positively. Whereas SCOK has four dimensions (speed, customization, privacy/security & superior functionality) that influence customer satisfaction, but speed, customization, and privacy have positive impacts while superior functionality has negative. Upon comparison, it is found privacy/security is the only dimension that is significant for both technologies. Also, for SCOK, it has greater t-value than JWOT, which indicated SCOK provides more privacy/security over JWOT. However, among other dimensions, there is no common significant dimension. In addition, although among the common dimension, SCOK is better. But, on the other hand, it also possesses superior functionality, a negatively significant

dimension. Although the remaining dimensions are different, considering the technology with an overall more positive impact on customer satisfaction, the effects of JWOT are stronger and positive than SCOK. Thus, it can be concluded on the basis of other dimensions and negative dimensions of SCOK that JWOT has a greater positive impact on customer satisfaction. This finding of the research is similar to the researcher's belief.

Further, upon examining the results related to customer loyalty, three dimensions turned out significant for both technologies. Two out of three dimensions are the same, speed and entertainment. The third significant dimension for SCOK and JWOT is superior functionality and privacy, respectively. Further, upon examining the impacts of two similar significant dimensions by using the t-values, it is found JWOT has a more considerable positive impact on customer loyalty more than SCOK. Similarly, upon measuring the third dimension, it found privacy impacts positively, whereas superior functionality is negatively influencing customer loyalty. Thus, it is evident that in achieving customer loyalty, in the retail industry, JWOT is more beneficial.

The last sub-question of this research is as follow,

“What are the main differences between the impacts of self-service technologies, JWOT, and SCOK?”

A number of differences are found from results. Starting from the most exciting findings, for SCOK, out of 8, 6 dimensions were found significant. Five had a positive influence, and one was a negative influence on customer behavior. Positive dimensions are speed, entertainment, customization, and privacy/security. Superior functionality is only a negative dimension. However, for JWOT, four dimensions were found significant, and all have positive impacts on customer behavior. The dimensions positively significant for JWOT are speed, entertainment, privacy, and control. Further, the effects of the dimensions of JWOT are also more significant than the dimensions of SCOK.

4.8 Answer to the main research question

The main question of the research is as follows.

In retailing, which dimensions of service quality effects customers to adopt just-walkout technology over self-checkout technology, by increasing their satisfaction and loyalty?

For answering the main question, the answers to sub-questions and results of the hypotheses are used. They depict that in JWOT, only two dimensions have more significant positive impacts on customer satisfaction than SCOK. Those two dimensions are entertainment and control. Further, for customer loyalty, three dimensions of JWOT have significant positive effects, which are higher than the impact of dimensions of SCOK.

5 DISCUSSION AND CONCLUSION

5.1 Conclusion

Even after two decades, self-service technologies are emerging trends in the retail industry. Retailers are merging SST's with traditional checkouts, at an ever-increasing rate. Similarly, customers also feel comfortable and relaxed while using SST's. As the world evolves, human-technology interaction has also evolved. Earlier self-checkout technology is the only SST customers interact with, but now there are several SST's such as just walk out technology, also known as checkout-less technology. Thus, the innovation in SST's not only changed the interface but also the interaction process. But for retailers, continuous innovation brought complexity, make it hard to decide between SST's. Therefore, it becomes crucial to determine which technology is more effective for enhancement of service quality as several studies depict it has a significant impact on satisfaction and loyalty. Mainly, this research focus on the retail industry of Finland.

The retail industry of Finland has a lower contribution to the economy than other Scandinavian countries. However, the government is trying to uplift it by the level of Sweden, at least. It is evident from literature, technology, and service quality are critical for retailers and provides a competitive advantage. As the Finnish retail industry is still in an oligopolistic state (Uusitalo & Rökman, 2007), K-group and S-group having more than 80% of market share. Adoption of advanced technology becomes a game-changer for both groups. However, before this study, the impact of JWOT on customer behavior was unclear and uncertain, in comparison to SCOK. Several researchers have found several attributes of SCOK that positively and significantly affect satisfaction and loyalty, complimenting an increase in revenue and a decrease in costs.

The results indicate just-walkout technology in terms of customer loyalty has far more influence than SCOK. The relation of, SCOK, and JWOT, with customer satisfaction, has almost the same as there are not many differences between the impacts. But, results depict the superior functionality that SCOK provides effects negatively on customer satisfaction. That decreases the overall impact of service quality of SCOK on customer

satisfaction. As JWOT has all positive outcomes, thus it is more useful for the retail industry of Finland.

5.2 Theoretical and managerial contributions

5.2.1 Theoretical contributions

The results of this study have provided crucial contributions to existing literature. In literature, scholars (Dabholkar, 1996; Lin & Hsieh, 2011; Fatma & Ali, 2014; Iqbal et al., 2018) have used the holistic approach and examined the impacts of SST's collectively. However, this study has examined and compared two self-service technologies, self-checkout kiosks, and just-walkout technology—making it the first study as there is no previous study that has distinguished the SST's. Further, this study used the deductive approach and contributes to the literature of service quality by developing a conceptual model, separately for self-checkout kiosk and just-walkout technology, that incorporates existing theories as well as the empirical findings. In previous studies, different scale and measurement tools are developed to measure service quality for SST's and offered multiple dimensions. However, this study also narrowed down the scope by focusing on two technologies and provided empirical evidence related to significant dimensions of JWOT and SCOK.

Moreover, the most interesting finding of this research is discovering a new dimension named as entertainment. It is originated by merging item of two dimensions, enjoyment and design/aesthetic appeal, as they are highly correlated. In the prior researcher (Kim et al., 2014; Lin & Hsieh, 2011; Fatma & Ali, 2014), both dimensions are separately found positively significant while measuring the service quality of self-service technologies, a broader perspective. However, upon narrowing down, this research found the items that measure the entertaining traits of SCOK and JWOT are significant. Thus, they are merged and formed a new dimension.

Another remarkable finding of this researcher is related to a dimension named Speed. In the prior literature (Dabholkar, 1996; Dabholkar et al., 2003; Dabholkar & Eun-Ju, 2003) of service quality, speed was found positive but insignificant. However, this research opposes the findings of the afore-mentioned researcher, as speed is significant

for both technologies. Further, it endorses the arguments given by Anselmsson, (2001), Meuter et al. (2000), Lovelock and Young, (1979), and Collier and Sherrell (2010) that speed is positively significant dimensions of service quality in technological contexts.

Similarly, another interesting finding related to self-service technologies and customer behavior is that for customers, the ease of use and reliability of SCOK and JWOT barely matters as it turned out insignificant for both technologies. In theory, a considerable number of scholars emphasized the importance of these two traits such as Wolfinbarger and Gilly (2003), Evan and Browns (1988), Zeithaml et al. (2002) Collier and Sherrell (2010) Fatma and Ali (2014) and Lin and Hsieh (2011). This research is focused on SCOK and JWOT, specifically. In contrast, the studies mentioned above are either in a different context or had measured the service quality of self-service technologies broadly. Thus, these findings of this research are justified and considerable for further investigation.

Further, upon reviewing both technologies individually, it is found that their impacts are not identical because the impacts of dimensions of SST's are mixed (positive and negative). However, service quality dimensions of JWOT have a significant positive effect on customer satisfaction and loyalty. Before this study, the individual impacts of SCOK and JWOT are unclear as all the prior studies (Lin & Hsieh, 2011; Iqbal et al., 2018) are conducted using the perspective that is broader in nature. Similarly, this study has also extended the literature of JWOT, as it is minimal and only discussed in a few studies (Inman, & Nikolova, 2017;2020).

Further, this thesis provides a theoretical understanding of JWOT and SCOK. It also analyzed and compared the mechanism of both technologies and provides the grounds of how retailers can enhance customer relationships through them. Similarly, this study also offers the empirically validated conceptual framework for improving customer satisfaction and loyalty by employing JWOT and SCOK. By using the framework, the researchers can determine the scope of these technologies in other industries, such as the airline industry.

Also, this research has empirically analyzed the maximum number of dimensions of service quality, that significantly impacts customer behavior in different industries.

Further, the literature also lacks in providing the holistic approach where all the dimensions are empirically verified in research using the same demographics, which this study has attempted to fulfill. In a nutshell, the results of this research provide a strong base for starting a further investigation.

5.2.2 Managerial contributions

Managerially, this research provided a holistic view of the management of retail chains and helps in making an enduring impression by adopting the most effective technology, JWOT. It likely will diminish customer-service provider interaction and increase the dependence on technology, so the cost of human resources will also decrease at the point-of-sale. Thus, the findings of this research can be applied to the retail industry of Finland. It will facilitate retailers in understanding customer behavior, such as customer satisfaction and loyalty.

Also, the managers can understand the characteristics of just-walkout technology and self-checkout kiosk that are crucial for customers. Similarly, by generalizing the findings, managers of other industries, such as the airline industry and banking industry, have critical reasoning behind adopting just-walkout technology and self-checkout technology. Further, it helps decision-makers across the industry to understand customer behavior, in terms of customer satisfaction and loyalty, in an account of these technologies, and make strategic decisions accordingly.

Most importantly, these findings will help the supplier of self-service technologies in determining the potential of these technologies, particularly for Finland. The gradual increase in the adoption of this technology by vendors will increase the demand of suppliers as well for both technologies. Notably, for Finnish retailer S-group, this research is vital as they want to feature the SCOK in all retail grocery stores, around Finland. This study provides substantial grounds that the service quality of JWOT has more impacts and benefits than SCOK. Another contribution of this research was about investigating the customer complaints and dissatisfaction attached to the SCOK and JWOT. It would help the retailers in understanding the reason which hinders shoppers from using self-service technologies. Most customers have anticipated that they might face problems when they buy items in bulk. This complaint is common in both

technologies, making it the most crucial one. However, another complaint customer has about JWOT is that it is challenging to purchase items that need to be weighted, whereas for SCOK customers complaint about bagging difficulties. These findings will help not just retailers, but vendors as well, to determine the variations in customer behavior and timely resolving customer dissatisfaction.

5.3 Limitations and future research

This chapter will highlight the constraints and restrictions the researcher faced during this period. Following the limitations, the areas that need further exploration will also be highlights. In this research, only two self-service technologies are compared. However, there are still some SST's which need to be analyzed and compared. Therefore, in future research, researchers can compare more SST's, such as facial-recognition technology used by Jack & Jones in China (Amazon, 2018). The second limitation of this study is a sampling. The samples are taken from a particular group of people, students of the University of Oulu, which is not significant as well.

Similarly, Covid19 Pandemic is also a reason behind using a small population. Therefore, it is recommended to obtain data from different age groups and use different sampling techniques in future research. Similarly, as the data was collected by using an online survey, it raises questions on biasedness on respondents, which can be answered if the researcher collects survey thorough physical interaction. Therefore, keeping this study as a base, the researcher should collect data on a large scale through face to face encounters. Thus, the results can be and cannot be generalized, as the buying behavior differs among different age groups.

Also, the methodology this study employed is quantitative, which answers questions like What, Which and How. So, in future studies, the scope of this study can be further refined by using a qualitative method of data collection or a combination of quantitative and qualitative methods similarly. As this research emphasized the customer perspective about SST's that provide the viewpoint of the customer., therefore, for future research, investigating the view of managers and businesses could help in understanding the pros and cons of each self-service technology.

This study investigated customer behavior in terms of customer loyalty and customer satisfaction, measuring the direct impact of dimensions of SST's on them. Therefore, in the future, scholars could use other dependent variables or use mediating variables to measure customer behavior, such as repeat purchase and word of mouth.

Further, the industry this research focused on is the retail industry. However, self-service technologies are employed in several sectors such as hospitality, banking, railway, and the airline industry. Therefore, focusing on another sector will help to find more accurate results instead of generalizing the results of the retail industry for all others. Similarly, the subsequent studies could also examine the cross-cultural behavior towards SST's.

REFERENCES

- Akbar, M. M., & Parvez, N. (2009). Impact of service quality, trust, and customer satisfaction on customers loyalty. *ABAC journal*, 29(1).
- Anitsal, I., & Paige, R. C. (2006). An exploratory study on consumer perceptions of service quality in technology-based self-service. *Services Marketing Quarterly*, 27(3), 53-67.
- Anitsal, I., & Flint, D. J. (2006). Exploring customers' perceptions in creating and delivering value: technology-based self-service as an illustration. *Services Marketing Quarterly*, 27(1), 57-72.
- Anselmsson, J. (2001). Customer-perceived service-quality and technology-based self-service. *Lund University*. Press.
- Babakus, E., & Boller, G. W. (1992). An empirical assessment of the SERVQUAL scale. *Journal of Business research*, 24(3), 253-268.
- Bagozzi, R. P., & Yi, Y. (1988). On the evaluation of structural equation models. *Journal of the academy of marketing science*, 16(1), 74-94.
- Bagozzi, R. P., & Yi, Y. (2012). Specification, evaluation, and interpretation of structural equation models. *Journal of the academy of marketing science*, 40(1), 8-34.
- Balaji, M. S., & Roy, S. K. (2017). Value co-creation with Internet of things technology in the retail industry. *Journal of marketing management*, 33(1-2), 7-31.
- Bateson, J. E. G. (1985). Self-service consumer: an exploratory study. *Journal of Retailing*, 61(3), 49-76.
- Bebko, c. P. (2000). Service intangibility and its impact on consumer expectations of service quality. *Journal of services marketing*, 14(1), 9-26.
- Bezjian-Avery, A., Calder, B., & Iacobucci, D. (1998). New media interactive advertising vs. traditional advertising. *Journal of advertising research*, 38, 23-32.
- Bitner, M. J., Zeithaml, V. A., & Gremler, D. D. (2010). Technology's impact on the gaps model of service quality. In *Handbook of service science* (pp. 197-218). Springer, Boston, MA.
- Bolton, R. N., & Drew, J. H. (1991). A longitudinal analysis of the impact of service changes on customer attitudes. *Journal of marketing*, 55(1), 1-9.
- Boulding, W., Kalra, A., Staelin, R., & Zeithaml, V. A. (1993). A dynamic process model of service quality: from expectations to behavioral intentions. *Journal of marketing research*, 30(1), 7-27.
- Bowie, N. E., & Jamal, K. (2006). Privacy rights on the internet: self-regulation or government regulation?. *Business Ethics Quarterly*, 323-342.

- Brady, M. K., & Cronin Jr, J. J. (2001). Some new thoughts on conceptualizing perceived service quality: a hierarchical approach. *Journal of marketing*, 65(3), 34-49..
- Brady, M. K., Cronin Jr, J. J., & Brand, R. R. (2002). Performance-only measurement of service quality: a replication and extension. *Journal of business research*, 55(1), 17-31.
- Brady, M. K., & Robertson, C. J. (2001). Searching for a consensus on the antecedent role of service quality and satisfaction: an exploratory cross-national study. *Journal of Business research*, 51(1), 53-60.
- Caruana, A. (2002). Service loyalty, *European journal of marketing*, 36, 811-827.
- Chase, R. B. (1978). Where does the customer fit in a service operation?. *Harvard business review*, 56(6), 137-142.
- Cheng, A. (2019, 01 13). Why Amazon Go May Soon Change The Way We Shop. Retrieved from Forbes: <https://www.forbes.com/sites/andriacheng/2019/01/13/why-amazon-go-may-soon-change-the-way-we-want-to-shop/#cb11fc667097>
- Chen, Q., Clifford, S. J., & Wells, W. D. (2002). Attitude toward the site II: New information. *Journal of advertising research*, 42(2), 33-45.
- Chuawatcharin, R., & Gedsri, N. (2019). Factors influencing the attitudes and behavioural intentions to use just walk out technology among Bangkok consumers. *International journal of public sector performance management*, 5(2), 146-163.
- Churchill Jr, G. A., & Surprenant, C. (1982). An investigation into the determinants of customer satisfaction. *Journal of marketing research*, 19(4), 491-504.
- Clottey, T. A., Collier, D. A., & Stodnick, M. (2008). Drivers of customer loyalty in a retail store environment. *Journal of Service Science (JSS)*, 1(1), 35-48.
- Collier, J. E., & Bienstock, C. C. (2006). Measuring service quality in e-retailing. *Journal of service research*, 8(3), 260-275.
- Collier, J. E., & Sherrell, D. L. (2010). Examining the influence of control and convenience in a self-service setting. *Journal of the Academy of Marketing Science*, 38(4), 490-509.
- Considine, E., & Cormican, K. (2016). Self-service technology adoption: An analysis of customer to technology interactions. *Procedia Computer Science*, 100(100), 103-109.
- Cronin Jr, J. J., & Taylor, S. A. (1992). Measuring service quality: a reexamination and extension. *Journal of marketing*, 56(3), 55-68.
- Cronin Jr, J. J., & Taylor, S. A. (1994). Servperf versus servqual: reconciling performance-based and perceptions-minus-expectations measurement of service quality. *Journal of marketing*, 58(1), 125-131.
- Crosby, P. B. (1979). *Quality is free: The art of making quality certain*. New York: McGraw-Hill.

- Dabholkar, P. A. (1996). Consumer evaluations of new technology-based self-service options: an investigation of alternative models of service quality. *International Journal of research in Marketing*, 13(1), 29-51.
- Dabholkar, P. A., & Bagozzi, R. P. (2002). An attitudinal model of technology-based self-service: moderating effects of consumer traits and situational factors. *Journal of the Academy of marketing science*, 30(3), 184-201.
- Dabholkar, P. A. & Eun-Ju, L. (2003). Understanding consumer motivation and behavior related to self-scanning in retailing. Implications for strategy and research on technology-based self-service. *International Journal of Service Industry Management*, 14(1), 59-95.
- Dabholkar, P. A., & Sheng, X. (2009). The role of perceived control and gender in consumer reactions to download delay. *Journal of business research*, 62(7), 756–760.
- Dabholkar, P. A., Bobbitt, L. M., & Lee, E. J. (2003). Understanding consumer motivation and behavior related to self-scanning in retailing. *International Journal of Service Industry Management*. 14(1), 59–95.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 13 (3), 319–40.
- Day, R. L. (1984). Modeling choices among alternative responses to dissatisfaction. *ACR North American Advances*. 496-499.
- Dean, D. H. (2008). Shopper age and the use of self-service technologies. *Managing Service Quality*, 18(3), 225–238.
- Dick, A. S., & Basu, K. (1994). Customer loyalty: toward an integrated conceptual framework. *Journal of the academy of marketing science*, 22(2), 99-113.
- Eastlick, M. A., Lotz, S. L., & Warrington, P. (2006). Understanding online B-to-C relationships: An integrated model of privacy concerns, trust, and commitment. *Journal of Business Research*, 59(8), 877-886.
- Evans, K. R., & Brown, S. W. (1988). *Strategic options for service delivery systems*. First Interstate Center for Services Marketing, Arizona State University.
- Erik, M. & Marko, S. (2011). *A concise guide to market research: The process, data, and methods using IBM SPSS Statistics*. New York: Springer.
- Fatma, D. O. & Ali, K. (2014). Supermarket self-checkout service quality, customer satisfaction and loyalty: empirical evidence from an emerging market. *Journal of retailing and consumer services*, 118-129.
- Featherman, M. S., & Hajli, N. (2016). Self-service technologies and e-services risks in social commerce era. *Journal of business ethics*, 139(2), 251-269.
- Fitzsimmons, J. A. (2003). Is self-service the future of services?. *Managing Service Quality: An International Journal*, 13(6), 443–444.
- Fornell, C., & Larcker, D. F. (1981). Structural Equation Models with Unobservable Variables and Measurement Error: Algebra and Statistics. *Journal of Marketing Research*, 18(3), 382–388.

- Giese, J. L., & Cote, J. A. (2000). Defining consumer satisfaction. *Academy of marketing science review*, 4, 1-24.
- Gomes, L. (2018, 10 24). Amazon go has competition: meet 6 other automated stores transforming retail. Retrieved from Current Daily: <https://thecurrentdaily.com/2018/10/24/amazon-go-competition-automated-stores/>
- Grapentine, T. (2000). Path analysis vs. structural equation modeling. *Marketing research*, 12(3), 12-20.
- Grewal, D., Roggeveen, A. L., & Nordfält, J. (2017). The Future of Retailing. *Journal of Retailing*, 93(1), 1-6.
- Grewal, D., Noble, S. M., Roggeveen, A. L., & Nordfalt, J. (2020). The future of in-store technology. *Journal of the Academy of Marketing Science*, 48(1), 96-113.
- Grönroos, C. (1984). A service quality model and its marketing implications. *European journal of marketing*, 18(4), 36-44.
- Grönroos, c. (1990). Relationship approach to marketing in service contexts: the marketing and organizational behavior interface. *Journal of business research*, 20(1), 3-11.
- Hair Jr, J. F., Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM). *European business review*. (26), 106-121.
- Hair, J. F., Black, W. C., Babin, B. J. & Anderson, R. E. (2014). *Multivariate data analysis*. Harlow: Upper Saddle River.
- Hamacher, A. (2017, 5 10). The unpopular rise of self-checkouts (and how to fix them). Retrieved from BBC: <https://www.bbc.com/future/article/20170509-the-unpopular-rise-of-self-checkouts-and-how-to-fix-them>
- Harris, L. C., & Goode, M. M. (2010). Online servicescapes, trust, and purchase intentions. *Journal of Services Marketing*, 24 (3), 230-243.
- Herubin, D. (2003). Kmart wants to pull plug on self-checkout – Bankrupt discounter says the machines cost too much and allow too much theft. *Orange County Register*, Feb. 27
- Hinkin, T. R. (1995). A Review of Scale Development Practices in the Study of Organizations. *Journal of Management*, 21(5), 967– 88.
- Hoffman, D., & Novak, T. P. (1996). Marketing in hypermedia computer-mediated environments: Conceptual foundations. *Journal of Marketing*, 60, 50–68.
- Hoffman, D. L., Novak, T. P., & Peralta, M. (1999). Building consumer trust online. *Communications of the ACM*, 42(4), 80-85.
- Hoyer, W. D., Macinnis, D. J., & Pieters, R. (2001). *Customer behavior*. Boston, Houghton Mifflin Company.
- Hsieh, C. T. (2005). Implementing self-service technology to gain competitive advantages. *Communications of the IIMA*, 5(1), 9, 77-83.

- Hu, L. T., & Bentler, P. M. (1995). Evaluating model fit. In R. H. Hoyle (Ed.), *Structural equation modeling: Concepts, issues, and applications* (pp. 76-99). Thousand Oaks, CA: Sage.
- Hu, L. & Bentler, P. H. (1999) Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives, *Structural Equation Modeling: A Multidisciplinary Journal*, 6:1, 1-55, DOI: 10.1080/10705519909540118
- Iacobucci, D. (2008). *Quantitative Applications in the Social Sciences: Mediation analysis*. Thousand Oaks, CA: SAGE Publications, Inc. doi: 10.4135/9781412984966
- Inman, J. J., & Nikolova, H. (2017). Shopper-facing retail technology: A retailer adoption decision framework incorporating shopper attitudes and privacy concerns. *Journal of Retailing*, 93(1), 7-28.
- Iqbal, M. S., Hassan, M. U., & Habibah, U. (2018). Impact of self-service technology (SST) service quality on customer loyalty and behavioral intention: The mediating role of customer satisfaction. *Cogent Business & Management*, 5(1), 1423770.
- Jain, S. K., & Gupta, G. (2004). Measuring service quality: SERVQUAL vs. SERVPERF scales. *Vikalpa*, 29(2), 25-38.
- Jennifer, R. (1995). Multimedia kiosks in retailing. *International Journal of Retail & Distribution Management*, 23(5), 32-40
- Juran, J. M., & Godfrey, A. B. (1998). *Juran's quality handbook*. New York: McGraw Hill.
- Kaiser, H. F. (1970). A second generation little jiffy. *Psychometrika*, 35(4), 401-415.
- Kandampully, J., Zhang, T. C., & Bilgihan, A. (2015). Customer loyalty: a review and future directions with a special focus on the hospitality industry. *International Journal of Contemporary Hospitality Management*.
- Khurana, S. (2013). Service quality versus customer satisfaction in banking sector: A literature review. *The IUP Journal of Marketing Management*, 12(4), 65-78.
- Kim, T., Kim, M. C., Moon, G., & Chang, K. (2014). Technology-based self-service and its impact on customer productivity. *Services Marketing Quarterly*, 35(3), 255-269.
- Kim, W. G., Li, J. J., & Brymer, R. A. (2016). The impact of social media reviews on restaurant performance: The moderating role of excellence certificate. *International Journal of Hospitality Management*, 55, 41-51.
- Kline, R. B. (1998). Software review: Software programs for structural equation modeling: Amos, EQS, and LISREL. *Journal of psychoeducational assessment*, 16(4), 343-364.
- Kotler, P., & Armstrong, G. (1999). *Principles of marketing*. England, 2nd edition: Prentice Hall.

- Kohan, S. E. (2020, 03 15). Amazon's Sharing Of Cutting-Edge Technology May Change The Way You Shop For Groceries. Retrieved from Forbes: <https://www.forbes.com/sites/shelleykohan/2020/03/15/amazons-sharing-of-cutting-edge-technology-may-change-the-way-you-shop-for-groceries/#61d01243e310>
- Kotler, P. (2002). *Marketing places*. Simon and Schuster.
- Kulich, C., Trojanowski, G., Ryan, M.K., Alexander Haslam, S. & Renneboog, L.D.R. (2011). Who gets the carrot and who gets the stick? Evidence of gender disparities in executive remuneration. *Strategic management journal*, 32, 301-321.
- Kumar, R. & Mittal, A. (2015). Customer satisfaction and service quality perception of technology based-banking services: a study on selected public sector banks in india. *Global journal of management and business research*, 15(1), 39-45.
- Kumar, R (2005). The competitive impact of service process improvement: examining customers' waiting experiences in retail markets. *Journal of retailing*, 81(3), 171-180.
- Lam, T., & Zhang, H. Q. (1999). Service quality of travel agents: the case of travel agents in Hong Kong. *Tourism management*, 20(3), 341-349.
- Langeard, E., Bateson, J., Lovelock, C. H., & Eiglier, P. (1981). Marketing of services: New insights from consumers and managers. *Marketing Science Institute*, Cambridge, MA, 81-104.
- Launonen, t. (2012, june 20). A finnish grocery store is testing self-checkout. Retrieved from fujitsu: https://www.fujitsu.com/fi/about/resources/news/english/2012/self_checkout.html
- Lee, J., & Allaway, A. (2002). Effects of personal control on adoption of self-service technology innovations. *Journal of service marketing*, 16(6), 553-572.
- Lee, H., Lee, Y., & Yoo, D. (2000). The determinants of perceived service quality and its relationship with satisfaction. *Journal of services marketing*, 14(3), 217-231.
- Lewis, R. C., & Booms, B. H. (1983). The marketing aspects of service quality. In I. S. Berry, *Emerging perspective on service marketing*, (pp. 99-107). Chicago: American Marketing Association.
- Liljander, V., & Strandvik, T. (1992). The relation between service quality, satisfaction and intentions. *Swedish School of Economics and Business Administration*.
- Lin, J. S. C., & Hsieh, P. L. (2011). Assessing the self-service technology encounters: development and validation of SSTQUAL scale. *Journal of retailing*, 87(2), 194-206.
- Lombard, M., & Snyder-Duch, J. (2001). Interactive advertising and presence: A framework. *Journal of interactive Advertising*, 1(2), 56-65.

- Lovelock, C. H., & Young, R. F. (1979). Look to consumers to increase productivity. *Harvard business review*, 57(3), 168-178.
- Luk, S. T. K., & Layton, R. (2004). Managing both outcome and process quality is critical to quality of hotel service. *Total Quality Management & Business Excellence*, 15(3), 259-278.
- Mathwick, C., Wagner, J., & Unni, R. (2010). Computer-mediated customization tendency (CMCT) and the adaptive e-service experience. *Journal of Retailing*, 86(1), 11-21.
- Masseran, N. (2015). Evaluating wind power density models and their statistical properties. *Energy*, 84, 533-541.
- McDonald, R. P., & Ho, M. H. R. (2002). Principles and practice in reporting structural equation analyses. *Psychological methods*, 7(1), 64.
- Meuter, M. L., Ostrom, A. L., Roundtree, R. I., & Bitner, M. J. (2000). Self-service technologies: understanding customer satisfaction with technology-based service encounters. *Journal of marketing*, 64(3), 50-64.
- Meuter, M. L., Ostrom, A. L., Bitner, M. J., & Roundtree, R. (2003). The influence of technology anxiety on consumer use and experiences with self-service technologies. *Journal of Business Research*, 56(11), 899-906
- Meuter, M. L., Bitner, M. J., Ostrom, A. L., & Brown, S. W. (2005). Choosing among alternative service delivery modes: An investigation of customer trial of self-service technologies. *Journal of marketing*, 69(2), 61-83.
- Mills, P. K., Chase, R. B., & Margulies, N. (1983). Motivating the client/employee system as a service production strategy. *Academy of management Review*, 8(2), 301-310.
- Mittal, V., & Kamakura, W. A. (2001). Satisfaction, repurchase intent, and repurchase behavior: Investigating the moderating effect of customer characteristics. *Journal of marketing research*, 38(1), 131-142.
- Moon, H., Park, J., & Kim, S. (2015). The importance of an innovative product design on customer behavior: development and validation of a scale. *Journal of Product Innovation Management*, 32(2), 224-232.
- Mothersbaugh, D. L., & Hawkins, D. I. (2016). *Consumer behavior: Building marketing strategy*. McGraw-Hill Education,.
- Nelson. (2001). Sustainable competitive advantage from information technology: limitations of the value chain. *Strategic information technology: opportunities for competitive advantage*, 40-55.
- Ølander, C. F. (1977). Consumer satisfaction-A skeptic's view. *Conceptualization and measurement of consumer satisfaction and dissatisfaction*, 409-452. Marketing Science Institute.
- Oliver, R. L. (1999). Whence consumer loyalty? *Journal of marketing*, 63(4), 33-44.
- Oliver Richard, L. (1997). *Satisfaction: A behavioral perspective on the consumer*. New York ' NY: Irwin-McGraw-Hill.

- Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of marketing research*, 17, 460-469. [Http://dx.doi.org/10.2307/3150499](http://dx.doi.org/10.2307/3150499)
- Olson, J. C., & Dover, P. A. (1979). Disconfirmation of consumer expectations through product trial. *Journal of Applied psychology*, 64(2), 179.
- Parasuraman, A., & Grewal, D. (2000). The impact of technology on the quality-value-loyalty chain: a research agenda. *Journal of the academy of marketing science*, 28(1), 168-174
- Parasuraman, A., Berry, L. and Zeithaml, V. (1985). A conceptual model of service quality and its implication for future research. *Journal of marketing*, 49(4), 41-50.
- Parasuraman, A., Berry, L. and Zeithaml, V. (1988). SERVQUAL: A multiple-item scale for measuring consumer perc. *Journal of retailing*, 64(1), 12.
- Parasuraman, A., Berry, L. and Zeithaml, V. (1991). Refinement and reassessment of SERVQUAL scale. *Journal of retailing*, 67(4), 420-50.
- Parasuraman, A., Zeithaml, V. A., & Malhotra, A. (2005). ES-QUAL: A multiple-item scale for assessing electronic service quality. *Journal of service research*, 7(3), 213-233.
- Payne, A., (1993). *The essence of services marketing*. Prentice Hall.
- PTY (2017). Finnish grocery trade. *Finnish Grocery Trade Association*. Retrieved from <https://www.pty.fi/front-page/publications-statistics/>
- PTY (2018). Finnish grocery trade. *Finnish Grocery Trade Association*. Finnish grocery trade. Retrieved from <https://www.pty.fi/front-page/publications-statistics/>
- Pearson, S. (2016). Building brands directly: creating business value from customer relationships. Springer.
- Peng, T. (2018, 01 23). Amazon Go vs Alibaba Tao Cafe: Staffless Shop Showdown. Retrieved from Medium: <https://medium.com/syncedreview/amazon-go-vs-alibaba-cao-cafe-staffless-shop-showdown-3f3929393d62>
- Radomir, L., & Nistor, C. V. (2012). High-educated consumer perceptions of service quality: an assessment of the SSTQUAL scale in the Romanian banking industry. *Procedia Economics and Finance*, 3, 858-864.
- Radomir, L., & Nistor, C. V. (2014). Comparing the original and the revised SSTQUAL scale among high-educated consumers in Romania. *Procedia Economics and Finance*, 15, 926-934.
- Rai, A. K., & Medha, S. (2013). The antecedents of customer loyalty: An empirical investigation in life insurance context. *Journal of Competitiveness*, 5(2), 139-163.
- Regan, w. J. (1963). The service resolution. *Journal of marketing*.
- Reichheld, F. F. (2003). The one number you need to grow. *Harvard business review*, 81(12), 46-55.

- Reynolds-McIlnay, R., & Morrin, M. (2019). Increasing shopper trust in retailer technological interfaces via auditory confirmation. *Journal of Retailing*, 95(4), 128-142.
- Rust, R. T., & Oliver, R. L. (1994). Service quality: insights and managerial implications from the frontier. *Service quality: New directions in theory and practice*, 1-19.
- Ryan, C., & Cliff, A. (1997). Do travel agencies measure up to customer expectation? An empirical investigation of travel agencies' service quality as measured by SERVQUAL. *Journal of Travel & Tourism Marketing*, 6(2), 1-31.
- Sainy, R. (2010). A Study of the Effect of Service Quality on Customer Loyalty in Retail Outlets. *Vilakshan: The XIMB Journal of Management*, 7(2), 49-62.
- Schumacker, R. E., & Lomax, R. G. (2004). *A beginner's guide to structural equation modeling*. psychology press.
- Seth, Deshmukh, & Vrat. (2005). Service quality models: a review. *International journal of quality & reliability management*, 22(9), 913-49.'
- Setó-Pamies, D. (2012). Customer loyalty to service providers: examining the role of service quality, customer satisfaction and trust. *Total Quality Management & Business Excellence*, 23(11-12), 1257-1271.
- Smith, A. M. (1995). Measuring service quality: is SERVQUAL now redundant?. *Journal of Marketing Management*, 11(1-3), 257-276.
- Steyn, R. (2017). How many items are too many? An analysis of respondent disengagement when completing questionnaires.
- Tabachnick, B. G., Fidell, L. S., & Ullman, J. B. (2007). *Using multivariate statistics*, 5, 481-498. Boston, MA: Pearson.
- Teas, R. K. (1993). Expectations, performance evaluation, and consumers' perceptions of quality. *Journal of marketing*, 57(4), 18-34.
- Thomas, S. (2013). Linking customer loyalty to customer satisfaction and store image: a structural model for retail stores. *Decision*, 40(1-2), 15-25.
- Truong, Y., Klink, R. R., Fort-Rioche, L., & Athaide, G. A. (2014). Consumer response to product form in technology-based industries. *Journal of Product Innovation Management*, 31(4), 867-876.
- Tung, L. L., & Tan, J. H. (1998). A model for the classification of information kiosks in Singapore. *International Journal of Information Management*, 18(4), 255-265.
- UCLA Statistical Consulting (2020). What does Cronbach's alpha mean? SPSS FAQ. Available at: <<https://stats.idre.ucla.edu/spss/faq/what-does-cronbachs-alpha-mean/>> Cited 26 March 2020.
- Ullman, J. B. (2001). Structural equation modeling. In B. G. Tabachnick & L. S. Fidell (2001). *Using Multivariate Statistics* (4th ed& pp 653- 771). Needham Heights, MA: Allyn & Bacon.

- Uusitalo, O., & Rökman, M. (2007) The impacts of competitive entry on pricing in the finnish retail grocery market. *International journal of retail & distribution management*, 35(2), 120-135.
- Vuoriaro, p. (2018, 06 04). Finnish stores alepa and sale now offer self-checkout option for busy customers. Retrieved from net fujitsu: [https://net.fujitsu.fi/en-us/2018/finnish_stores_alepa_and_sale_now_offer_\(9840\)](https://net.fujitsu.fi/en-us/2018/finnish_stores_alepa_and_sale_now_offer_(9840))
- Westbrook, R. A. (1981). Sources of consumer satisfaction with retail outlets. *Journal of retailing*, 57(3), 68-85.
- Westbrook, R. A., & Reilly, M. D. (1983). Value-percept disparity: an alternative to the disconfirmation of expectations theory of consumer satisfaction. *ACR North American Advances*, 256-261.
- Wilkins, H. (2010). Using importance-performance analysis to appreciate satisfaction in hotels. *Journal of Hospitality Marketing & Management*, 19(8), 866-888.
- Wolfenbarger, M., & Gilly, M. C. (2003). eTailQ: dimensionalizing, measuring and predicting etail quality. *Journal of retailing*, 79(3), 183-198.
- Wong, A., & Sohal, A. (2003). Service quality and customer loyalty perspectives on two levels of retail relationships. *Journal of services marketing*, 17(5), 495-513.
- Woodruff, R. B., Clemons, D. S., Schumann, D. W., Gardial, S. F., & Burns, M. J. (1991). The standards issue in CS/D research: a historical perspective. *Journal of Consumer Satisfaction, Dissatisfaction and Complaining Behavior*, 4, 103-109.
- Zeithaml, V. A., Parasuraman, A., & Malhotra, A. (2002). Service quality delivery through web sites: a critical review of extant knowledge. *Journal of the academy of marketing science*, 30(4), 362-375.
- Zeithaml, V. A. (2000). Service quality, profitability, and the economic worth of customers: what we know and what we need to learn. *Journal of the academy of marketing science*, 28(1), 67-85.
- Zhou, L. (2004). A dimension-specific analysis of performance-only measurement of service quality and satisfaction in China's retail banking. *Journal of Services Marketing*, 18(7), 534-46.
- Zhu, Z., Nakata, C., Sivakumar, K., & Grewal, D. (2007). Self-service technology effectiveness: the role of design features and individual traits. *Journal of the Academy of Marketing Science*, 35(4), 492-506..

Appendices

Appendix 1

Questionnaire for just-walkout technology

Gender

- Male
- Female

Age

- Enter age ____
- Prefer not to disclose

Education

- Elementary school
- High school
- Bachelors
- Masters
- Doctoral degree or higher education
- Prefer not to disclose

Employment

- Employed full time
- Employed part time
- Unemployed looking for work
- Unemployed not looking for work
- Retired
- Student
- Prefer not to disclose

Frequency of grocery Shopping.

- Daily
- 2-3 time a week
- 4-6 time a week
- One in a week
- Less than once in a week
- Prefer not to disclose

Time Spent on Shopping.

- Less than 15 minutes
- Between 15 - 30 minutes
- Between 30minutes - 1 hour
- Between one - two hours
- More than two hours
- Prefer not to disclose

Scenario: Just Walk Out technology:

Consider yourself going for a retail (grocery) store for shopping. You find out this store has a mobile verification method upon entrance, for which you need a smartphone with an application of store and account on the application. The account of application requires your personal information, social security number and banking credentials. After entering the store, you start doing groceries. Approaching the payment counter, you find that there is no cashier counter or self-service machine. There is just a walk away counter, which you must pass for checkout, which means the store has no check-out process. You only need to grab the product and walk out of the store. Once you have passed the counter, you received notification about your receipt and payment. The store only accepts payments

through its application to which you already authorized for billing while scanning the mobile when you are entering the store.

You estimate that the waiting time for using the Just Walk Out Technology (JWOT) to check-out will be shorter than the waiting time for checking out from a cashier or other technologies.

The Following questions were asked on the Likert type scale. (Value range: 1 = Strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = Neither disagree nor agree, 5 = Somewhat agree, 6 = agree, 7 = Strongly agree)

Enjoyment

- I anticipate that I would feel good if using the retail store's just walk-out technology.
- I anticipate that the retail store's just walk-out technology has entertaining functions.
- I anticipate that the retail store's just walk-out technology has interesting additional functions.

Superior Functionality

- I anticipate that the retail store's just walk-out technology offers superior and interactive shopping features.
- I anticipate that the retail store's just walk-out technology is aware of products and responds them accordingly.
- I anticipate that the retail store's just walk-out technology offers real time product and purchase information.
- I anticipate that the operation of the retail store's just walk-out technology is interesting.

Aesthetical Appeal / Design

- I anticipate that the interaction with the retail store's just walk-out technology is aesthetically appealing.
- I anticipate that the retail store's just walk-out technology appears to use up-to-date technology.
- I anticipate that the retail store's just walk-out technology appeals to my visual senses.

Ease of Use / Convenience

- I anticipate that interacting with the retail store's just walk-out technology does not require a lot of my mental effort.
- I anticipate that I find the retail store's just walk-out technology to be easy to use.
- I anticipate that my interaction with retail store's just walk-out technology is clear and understandable.
- I anticipate that it is easy to get the retail store's just walk-out technology to do what I want it to do.

Speed

- I anticipate that the retail store's just walk-out technology helps me in saving time.
- I anticipate that the retail store's just walk-out technology let me check out quickly.
- I anticipate that the retail store's just walk-out technology allows me to get my shopping done in a short time.

Control

- I anticipate that the retail store's just walk-out technology gives me control.
- I anticipate that the retail store's just walk-out technology let the customer be in charge.
- The retail store's self-checkout kiosk operates on the command of customer.

Customization

- I anticipate that the retail store's just walk-out technology understands my specific needs.
- I anticipate that the retail store's just walk-out technology has my best interests at heart.
- I anticipate that the retail store's just walk-out technology has features that are personalized for me.

Reliability

- The retail store's just walk-out technology is reliable with information.

- I anticipate that the retail store providing the just walk-out technology is well-known.
- I anticipate that the retail store providing the just walk-out technology has a good reputation in the market.

Privacy / Privacy

- I feel safe with my information with the retail store's just walk-out technology.
- I anticipate that I feel safe in my transactions with the retail store's just walk-out technology.
- I anticipate that a clear privacy policy is stated when I use the retail store's just walk-out technology.

Customer Satisfaction

- I am satisfied with the retail store's overall service quality.
- Due to just walk-out technology, the retail store's service quality is close to my perceptions.
- Due to just walk-out technology, the retail store's service quality meets my expectations.

Customer Loyalty

- I would like to shop in the store again.
- Due to just walk-out technology, I would recommend the store to others.
- Due to just walk-out technology, if I need to shop again, I will come to the store.
- Due to just walk-out technology, the store is my preferred choice.

Select top two complaints about technological checkouts.

- Lack of other information provided by cashiers (such as promos)
- Gets tedious when more items purchased
- Difficult to purchase items that need to be weighed
- Bagging difficulties

Appendix 2

Questionnaire for self-checkout kiosk

Gender

- Male
- Female

Age

- Enter age ____
- Prefer not to disclose

Education

- Elementary school
- High school
- Bachelors
- Masters
- Doctoral degree or higher education
- Prefer not to disclose

Employment

- Employed full time
- Employed part time
- Unemployed looking for work
- Unemployed not looking for work
- Retired
- Student
- Prefer not to disclose

Frequency of grocery Shopping.

- Daily
- 2-3 time a week
- 4-6 time a week
- One in a week
- Less than once in a week
- Prefer not to disclose

Time Spent on Shopping.

- Less than 15 minutes
- Between 15 - 30 minutes
- Between 30minutes - 1 hour
- Between one - two hours
- More than two hours
- Prefer not to disclose

Scenario: Self-Checkout Kiosk

Consider yourself in a retail (grocery) store for shopping. After collecting all the items, you approach the payment counter, where you find that you have two checking-out options: you may visit the cashier counter as usual or use the newly installed self-service check-out machine. The self-checkout machines are located just next to the cashier counter and have directions for use and scanning products on the machine. Both check-out options have the same products at the same prices and allow you to increase or decrease the order quantity (e.g., 'decreasing the number of drinks,' etc.). In both cases (self-checkout kiosk or cashier checkout), cash and other payment methods are accepted. You also find shopping bags next to self-checkout machines. Checking out is done by scanning the products through bar code, and items can be viewed on the screen once you scanned them, so if you make a mistake or change your

mind, you can further edit your shopping cart. Furthermore, in case if you are confused or machine got stuck at some point, an employee is also sitting next to self-service machines for helping.

You estimate that the waiting time for using the self-checkout kiosk (SCOK) to check-out will be shorter than the waiting time for checking out from a cashier.

The Following questions were asked on the Likert type scale. (Value range: 1 = Strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = Neither disagree nor agree, 5 = Somewhat agree, 6 = agree, 7 = Strongly agree)

Enjoyment

- I would feel good if using the retail store's self-checkout kiosk.
- The retail store's self-checkout kiosk has entertaining functions.
- The retail store's self-checkout kiosk has interesting additional functions.

Superior Functionality

- The retail store's self-checkout kiosk offers superior and interactive shopping features.
- The retail store's self-checkout kiosk is aware of products and responds to them accordingly.
- The retail store's self-checkout kiosk offers real time product and purchase information.
- The operation of the retail store's self-checkout kiosk is interesting.

Aesthetical Appeal / Design

- The interaction with the retail store's self-checkout kiosk is aesthetically appealing.
- The retail store's self-checkout kiosk appears to use up-to-date technology.
- The retail store's self-checkout kiosk appeals to my visual senses.

Ease of Use / Convenience

- Interacting with the retail store's self-checkout kiosk does not require a lot of my mental effort.
- I find the retail store's self-checkout kiosk to be easy to use.
- My interaction with retail store's self-checkout kiosk is clear and understandable.
- It is easy to get the retail store's self-checkout kiosk to do what I want it to do.

Speed

- The retail store's self-checkout kiosk helps me in saving time.
- The retail store's self-checkout kiosk let me check out quickly.
- The retail store's self-checkout kiosk allows me to get my shopping done in a short time.

Contrxol

- The retail store's self-checkout kiosk gives me control.
- The retail store's self-checkout kiosk let the customer be in charge.
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